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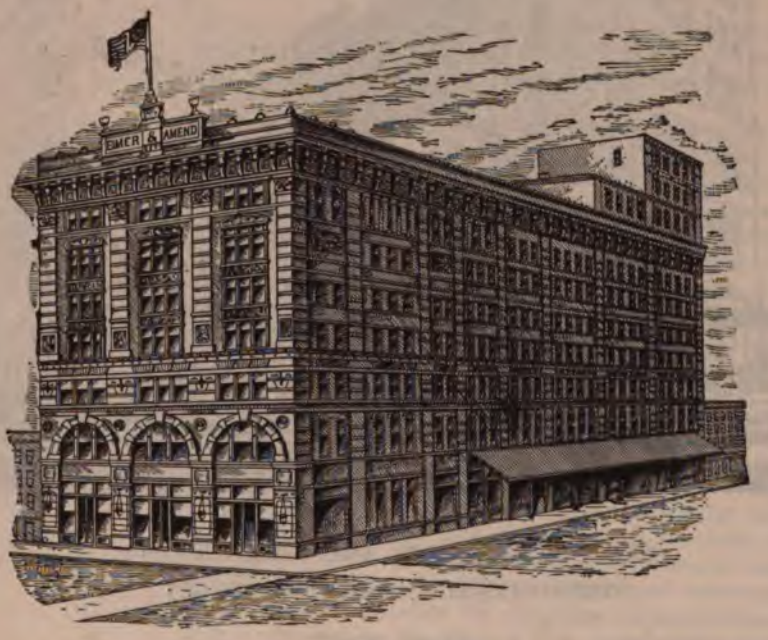
CATALOG AA, 1920 EDITION

Chemical and Metallurgical Laboratory Supplies and Assayers' Materials



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NEW YORK

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Established 1851 | **INTRODUCTION** | Incorporated 1897

In presenting *Catalog AA* of Chemical Laboratory Apparatus and Assay goods, it is necessary to offer our friends a few words of explanation. Items listed herein are of American manufacture, with a few exceptions, as, for example: Whatman, Prat Dumas, and Munktell Filter Papers; Lovibond Tintometers; and Vitreosil Ware.

The prices are those which were prevailing when the catalog went to press, and will serve as indicators of present prices. They are not binding and are subject to market fluctuations. An index system of all the goods we handle has been prepared, and all departments receive their prices from this key index, assuring the customer one and the same price for the same quantity of a given commodity purchased by him. Please note that all prices are on a net basis, except for quantities—as indicated.

Allow us to add a word as to our method of handling orders:—

NUMBERING. For convenience we have in general retained the numbers of our former catalog C. This has necessitated in some cases the use of additional letters and sub-numerals. Letters usually refer to parts only; sub-numerals, to apparatus.

STOCK. We endeavor to keep on hand a stock of everything herein listed sufficient to meet the requirements of our constantly increasing business. If our supply of any article becomes temporarily exhausted, we set every possible agency at work to replenish that stock without loss of time.

PACKING. All goods shipped by us are triple checked, and packed with great care by experienced men. The percentage of breakage in shipment is consequently very low. Shipments are insured, and **if breakage does occur the customer suffers no loss** other than the inconvenience of reporting the matter to us. Such report should, however, be made to us immediately, accompanied by a detailed statement of the breakage, so that formal claim may be entered by us against the transportation company. Prompt credit will be issued to cover the loss, or a replace shipment made, at the customer's option. For this a nominal insurance premium is charged. Claims for shortages frequently arise from a too casual examination of the packing material. Therefore, before claiming shortage in any shipment, the unpacker should examine with minute care every particle of packing material.

SHIPPING INSTRUCTIONS. Orders should be accompanied by the fullest shipping instructions, including marks and routing, otherwise we shall use our judgment as to the best way of forwarding.

TERMS. All prices are F. O. B. our store, New York City. Customers having regular charge accounts are entitled to terms of thirty days net from date of bill, except on items termed net cash (e.g. platinum) which are payable immediately upon receipt of bill. Customers having no account with us should send remittances with their orders. A 25% deposit should accompany request for C. O. D. shipment. We will gladly open new accounts for customers having satisfactory ratings in the reference books of the commercial agencies, or who furnish three satisfactory business references. For export accounts we recommend the establishment of commercial letter of credit, "to order of Eimer & Amend," against which payments can be obtained at correspondent-bank in New York upon presentation of sight draft against delivery of shipping documents. Customer is referred to his banker for further particulars.

The catalog will prove, we hope, a valuable book of reference, and be a means of giving an adequate description of any item for which information is desired. We issue, however, special pamphlets descriptive of the more important apparatus. Any of these will gladly be furnished on request. For list of other catalogs and special bulletins, see page preceding index.

Customers who are engaged in special lines will confer a favor by advising us, so that we can place them on our mailing list to receive bulletins of particular interest to them.

We offer the use of all our facilities to get information in regard to any article in our line in which you may be interested, and to obtain the article for you.

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80302

Metrical Weights and Measures

The French Metrical System is based upon the (assumed) length of the fourth part of a terrestrial meridian. The ten-millionth part of this arc was chosen as the unit of measures of length, and called a *Mètre*. The cube of the tenth part of the mètre was adopted as the unit of capacity, and denominated a *Litre*. The weight of a liter of distilled water at its greatest density was called a *Kilogramme*, of which the thousandth part, or *Gramme*, was adopted as the unit of weight. The multiples of these, proceeding in decimal progression, are distinguished by the employment of the prefixes *deca, hecto, kilo* and *myria*, from the Greek, and the subdivisions by *deci, centi*, and *milli*, from the Latin.

Table of Roughly Equivalent Measures

LENGTH

Cm.	0.3	0.5	0.6	0.8	1	1.1	1.3	1.6	2	2.2	2.5	3	3.2	4	4.5	4.7	5	Cm.
Inch	⅛	3/16	¼	5/16	⅜	7/16	½	⅝	¾	⅞	1	1⅛	1¼	1½	1¾	1⅞	2	Inch
Cm	6	6.5	7	7.5	8	9	10	11	11½	12	13	14	14½	15	16	16½	17	Cm.
Inch	2⅜	2½	2¾	3	3⅛	3½	4	4¼	4½	4¾	5⅛	5½	5¾	6	6¼	6½	6¾	Inch
Cm.	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	Cm.
Inch	7	7½	8	8¼	8¾	9	9½	10	10¼	10⅝	11	11½	11¾	12¼	12⅝	13	13⅜	Inch
Cm.	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	Cm.
Inch	13¾	14¼	14½	15	15⅜	15¾	16⅛	16½	17	17⅜	17¾	18	18½	19	19⅜	19¾	20	Inch
Cm.	52	53	54	55	56	57	58	59	60	61	....	....	....	....	....	....	....	Cm.
Inch	20½	21	21⅜	21¾	22	22½	22¾	23¼	23⅝	24	....	....	....	....	....	....	....	Inch

CAPACITY

CC.	15	20	30	60	100	125	200	250	300	400	500	600	750	....	....	....	CC.
Oz.	½	¾	1	2	3	4	6	8	10	12	16	20	24	....	....	....	Oz.
Liter	1	1¼	1½	2	2½	3	4	4½	5	6	7	8	10	12	15	....	Liter
Oz.	35	44	52	70	85	100	140	160	175	210	245	283	350	420	525	....	Oz.

Comparison Between U. S. and Metric Measures

MASS

1 grain	=	0.0648 gram	1 gram	=	15.4323 grains.
1 oz. Troy	=	31.103 "	1 gram	=	0.03215 oz. Troy.
1 oz. Avoir.	=	28.350 "	1 gram	=	0.035274 oz. Avoir.
1 lb. Avoir.	=	453.593 "	1 gram	=	0.0022046 lb. Avoir.
1 ton	=	1016.05 kilogram.	1 kilogram	=	0.0009842 ton.

LENGTH

1 inch	=	2.5400 cm.	1 cm.	=	0.39370 in.
1 foot	=	30.4797 cm.	1 cm.	=	0.032809 ft.
1 mile	=	160933.0 cm.	1 kilom.	=	0.62138 mile.

CAPACITY

1 fluid oz.	=	29.572 cc.	1 cubic ft.	=	28.3 liters.
1 pint	=	473.11 cc.	1 cc.	=	0.061 cu. in.
1 gallon	=	3.785 liters.	1 liter	=	61.028 cu. in.
1 cubic in.	=	16.387 cc.	1 liter	=	2.113 pints.

U. S. Weights and Measures

APOTHECARIES' WEIGHT.

lb.		oz.		drms		scruples.		grains.
1	=	12	=	96	=	288	=	5760
		1	=	8	=	24	=	480
				1		3	=	60
						1	=	20

AVOIRDUPOIS WEIGHT.

lb.		oz.		drms.		grains.
1	=	16	=	256	=	7000
		1	=	16	=	437.5
				1	=	27.343

TROY WEIGHT.

lb.		oz.		dwts.		grains.
1	=	12	=	240	=	5760
		1	=	20	=	480
				1	=	24

IMPERIAL FLUID MEASURE.

gallon.		pints.		fluid ozs.		fluid drams.
1	=	8	=	128	=	1024
		1	=	16	=	128
				1	=	16

1 gallon = 58328.886 grains of water at 16.7° C. = 62.06° F.
1 fluid oz. = 455.694 " " "
1 gallon = 231.000 cubic inches.
1 fluid oz. = 1.8047 " "
1 cubic foot of water = 1000 oz. Avoir.

Melting Points of the Chemical Elements

Abstract from Circular of The Bureau of Standards No. 35.

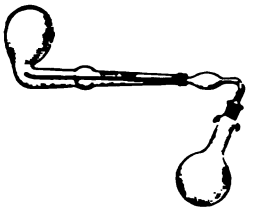
Element	F	C	Element	F	C
Helium	< − 456	< − 271	Barium	1560	850
Hydrogen	− 434	− 259	Praseodymium	1725	940?
Neon	− 423	− 253?	Germanium	1756	958
Fluorine	− 369	− 223	SILVER	1761	960.5
Oxygen	− 360	− 218	Glucinum	.....	> Ag
Nitrogen	− 346	− 210	Radium	.....	?
Argon	− 306	− 188	GOLD	1945.5	1063.0
Krypton	− 272	− 169	COPPER	1981.5	1083.0
Xenon	− 220	− 140	Manganese	2237	1225
Chlorine	− 150.5	− 101.5	Yttrium	.....	?
MERCURY	− 37.7	− 38.7	Samarium	2370–2550	1300–1400
Bromine	+ 18.9	− 7.3	Scandium	.....	?
Cæsium	79	26	Silicon	2588	1420
Gallium	86	30	NICKEL	2646	1452
Rubidium	100	38	Cobalt	2714	1490
Phosphorus	111.4	44	Chromium	2750	1510
Potassium	144	62.3	IRON	2768	1520
Sodium	207.5	97.5	PALLADIUM	2820	1549
Iodine	236.5	113.5	Zirconium	3100	1700?
Sulphur	S_I 235.0	112.8	Thorium	> 3090	> 1700
	S_{II} 246.6	119.2		< Pt.	< Pt.
	S_{III} 224.2	106.8	Vanadium	3150	1730?
Indium	311	155	PLATINUM	3191	1755
Lithium	367	186	Beryllium	> 3270	> 1800?
Selenium	422–428	217–220	Ytterbium	.....	?
TIN	449.4	231.9	Titanium	3450	1900?
Bismuth	520	271	Rhodium	3525	1940
Thallium	576	302	Ruthenium	> 3550	> 1950
CADMIUM	609.6	320.9	Columbium (Niobium)	4000	2200?
Lead	621.1	327.4	Boron	4000–4500	2200–2500
ZINC	786.9	419.4	Iridium	4170	2300?
Tellurium	846	452	Uranium	.....	?
ANTIMONY	1166	630.0	Molybdenum	4500	2500?
Cerium	1184	640	Osmium	4900	2700?
Magnesium	1204	651	Tantalum	5160	2850
ALUMINIUM	1217.7	658.7	TUNGSTEN	5430	3000
Calcium	1490	810	Carbon	> 6500 for p = 1 At.	> 3600 for p = 1 At.
Lanthanum	1490	810?			
Strontium	.....	> Ca < Ba?			
Neodymium	1544	840?			
Arsenic	1560	850?			

International Atomic Weights

See Journal of the American Chemical Society, Vol. XLI, No. 12, Dec., 1919.

		O — 16.
Aluminum	Al	27.1
Antimony	Sb	120.2
Argon	A	39.9
Arsenic	As	74.96
Barium	Ba	137.37
Bismuth	Bi	208.0
Boron	B	10.9
Bromine	Br	79.92
Cadmium	Cd	112.40
Cæsium	Cs	132.81
Calcium	Ca	40.07
Carbon	C	12.005
Cerium	Ce	140.25
Chlorine	Cl	35.46
Chromium	Cr	52.0
Cobalt	Co	58.97
Columbium	Cb	93.1
Copper	Cu	63.57
Dysprosium	Dy	162.5
Erbium	Er	167.7
Europium	Eu	152.0
Fluorine	F	19.0
Gadolinium	Gd	157.3
Gallium	Ga	70.1
Germanium	Ge	72.5
Glucinum	Gl	9.1
Gold	Au	197.2
Helium	He	4.0
Holmium	Ho	163.5
Hydrogen	H	1.008
Indium	In	114.8
Iodine	I	126.92
Iridium	Ir	193.1
Iron	Fe	55.84
Krypton	Kr	82.92
Lanthanum	La	139.0
Lead	Pb	207.2
Lithium	Li	6.94
Lutecium	Lu	175.0
Magnesium	Mg	24.32
Manganese	Mn	54.93
Mercury	Hg	200.6

		O — 16.
Molybdenum	Mo	96.0
Neodymium	Nd	144.3
Neon	Ne	20.2
Nickel	Ni	58.68
Niton (radium emanation)	Nt	222.4
Nitrogen	N	14.008
Osmium	Os	190.9
Oxygen	O	16.00
Palladium	Pd	106.7
Phosphorus	P	31.04
Platinum	Pt	195.2
Potassium	K	39.10
Praseodymium	Pr	140.9
Radium	Ra	226.0
Rhodium	Rh	102.9
Rubidium	Rb	85.45
Ruthenium	Ru	101.7
Samarium	Sa	150.4
Scandium	Sc	44.1
Selenium	Se	79.2
Silicon	Si	28.3
Silver	Ag	107.88
Sodium	Na	23.00
Strontium	Sr	87.63
Sulfur	S	32.06
Tantalum	Ta	181.5
Tellurium	Te	127.5
Terbium	Tb	159.2
Thallium	Tl	204.0
Thorium	Th	232.15
Thulium	Tm	168.5
Tin	Sn	118.7
Titanium	Ti	48.1
Tungsten	W	184.0
Uranium	U	238.2
Vanadium	V	51.0
Xenon	Xe	130.2
Ytterbium (Neoytterbium)	Yb	173.5
Yttrium	Y	89.33
Zinc	Zn	65.37
Zirconium	Zr	90.6



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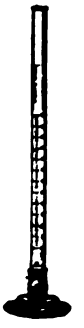

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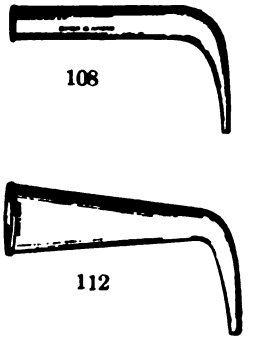

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112

116

100. **ABSORPTION APPARATUS—Bunsen & Fresenius,** for chlorine; with leading tube ground in neck of flask..... **2.80**

ABSORPTION BLOCKS, See Paper.

ABSORPTION BULBS—See Bulbs.

ABSORPTION TUBES—See Tubes.

102. **ACETOMETER—Gall,** for determining acid in must and wine. Consists of a graduated burette, pipette, and mixing flask, in wooden box with instructions for use..... **2.50**
Ammonia Test Liquor for Acetometer.....**per quart** **.80**
Litmus Tincture for Acetometer.....**per pint** **.45**

104. **ACETOMETER—Otto,** for determining percentage of Acetic acid in Vinegar..... **2.20**

ACID PITCHERS—See Pitchers.

ACID PUMPS—See Pumps.

108. **ADAPTERS—light glass,** end bent at right angle.

Total length, inches	6	7	8	10
Diameter—large end, inches	¾	1	1¼	1⅜
Each	**.20**	**.25**	**.30**	**.35**

110. **Ditto**—End bent at angle of about 45°. Same sizes and prices as No. 108.

112. **ADAPTERS—heavy glass,** bent.

Diameter—large end, inches	½	1	1½	2	2½	3
Each	**.30**	**.35**	**.40**	**.45**	**.75**	**.90**

114. **Ditto**—straight. Same sizes and prices as No. 112.

116. **AIR TESTER—Wolpert Improved,** for quickly obtaining the amount of CO_2 in the air, by direct reading from the graduations etched on the instrument..... **4.75**
Reagents for same.....**per dozen capsules** **2.40**

AIR BATHS—See Ovens.

AIR PUMPS—See Blowers and Pumps.

ALKALIMETERS—See Carbon Dioxide Apparatus.

ALUNDUM WARE—See Index.

119

120

119. ALCOHOLOMETER—Juerst (patented) for the rapid and accurate determination of alcohol from 1/10 of 1% to 7% inclusive; standard instrument for determining percentage of alcohol in beer, cider, light wines, and other beverages, also for vinegar. Complete with case, precision thermometer, calculation tables, and instructions for use. *Complete determination can be made within 15 minutes. Requires no special skill to operate it.* Accurate to within 1/10 of 1% **60.00**

Bunsen Burner No. 1506 can be used instead of alcohol lamp.

119a. Extra Precision Thermometer for above **17.50**

For other Alcoholometers see Hydrometers.

120. AMMETER—"Imperial" Type, for *direct current,* suitable for general laboratory purposes. Accurate, hand calibrated, best quality jewel and pivot bearings. Brass case furnished in baked enamel. Diameter 4 inches.

Range, amperes	1	5	10	15
Divisions	1/50	1/10	1/5	¼
Each	**11.90**	**11.90**	**13.00**	**13.00**
Range, amperes	30	50	100	200
Divisions	½	1	2	4
Each	**13.30**	**14.40**	**15.80**	**17.30**

120/1. AMMETER—same type as above but for **alternating current.**

Range, amperes	1	5	10	15	30	50
Divisions	1/50	1/10	1/5	¼	½	1
Each	**11.90**	**11.90**	**13.00**	**13.00**	**13.30**	**14.40**

122. AMMETER—"Portable Standard" type, of the best make and highest accuracy. A hardwood carrying case is supplied with each instrument for **direct current.** See cut on next page.

Maximum range, amperes	5	15	25	50
Divisions	1/20	1/10	1/5	½
Each	**68.40**	**68.40**	**68.40**	**72.00**

122/1. AMMETER—same type as above but for **alternating current.**

Maximum range, amperes	5	10	25	50
Divisions	1/20	1/10	1/5	½
Each	**72.00**	**72.00**	**72.00**	**73.40**

122-124

125

126

124. **AMMETER—Milli,** same style as No. 122 for **direct** current.

Range, milliamperes	25	150	500	1500
Divisions	1/5	1/1	5	10
Each	**64.80**	**64.80**	**64.80**	**64.80**

When ordering be sure to specify voltage. If current is A. C. indicate also number of phases and cycles.

125. **AMMETER—Type G. S. A.,** alternating current.

Range, amperes	1	15	25	50
Subdivisions	1/100	1/10	1/5	½
Each	**25.20**	**24.50**	**24.50**	**25.20**

125./1. **AMMETER—Type G. S. D.,** direct current with self-contained shunt.

Range, amperes	1	15	25	50
Subdivisions	1/100	1/10	1/5	½
Each	**41.75**	**41.75**	**41.75**	**42.50**

126. **AMMETER—pocket portable, "H. D. Type,"** compact and light. Mechanism is of the permanent magnet, moving coil type, thus insuring uniform scale divisions and dead beat indications. Moving coil is light and very rigid. Jewels are carefully selected Ceylon sapphires. Dial pure white bristol board. Brass case size 4″ x 5″ x 2″. **For direct current.**

Range, amperes	5	10	25	50	75
Subdivisions	1/10	1/5	½	1	1
Each	**18.00**	**18.00**	**18.00**	**18.00**	**21.60**
Leather Carrying Case, extra	**11.00**	**11.00**	**11.00**	**11.00**	**11.50**

126/1. **AMMETER**—pocket portable "H. A." Type same style as above but for **alternating current.**

Range, amperes	5	10	30	50
Subdivisions	1/10	1/5	½	1/1
Each	**18.00**	**18.00**	**18.00**	**18.00**
Leather Carrying Case, extra	**11.00**	**11.00**	**11.00**	**11.00**

When ordering be sure to specify voltage. If current is A. C. indicate also number of phases and cycles.

Ammonia Absorption Apparatus, Folin, see No. 7272.

127

127. **AMPULE**—flint or amber glass.

Capacity, cc.	1	2	3	5	10
Gross	**3.35**	**3.35**	**4.35**	**5.75**	**7.70**

128-130

131

133

134

136

138

128. **ANEMOMETER—Biram,** with zero setting attachment. For registering the velocity of air in mines, tunnels, etc., the revolutions are recorded on a dial in the centre of the instrument. Diameter, 3 inches, 2 dials reading to 1,000 ft. in morocco case **40.00**

130. **Ditto**—Diameter 4 inches, 4 dials reading to 100,000 ft. in morocco case..... **42.75**

131. **ANEMOMETER**—For the measurement of air currents through mines, tunnels, and the ventilation of hospitals, public buildings, etc. The indications are obtained by means of a delicately poised fan wheel, the recording being commenced by the long hand, which traverses the outer circumference of the main dial, showing the passage of 100 feet of air, with 6 dials reading to 10,000,000 feet, with zero-setting attachment, jewelled movement, in leather case..... **44.00**

133. **ANEMOMETER**—High Speed, for measuring air velocities up to 6,000 feet per minute, registering to 1,000,000 feet by 10 feet intervals, with disconnector and zero-setting arrangement, in leather pouch with belt strap **60.00**

134. **ANVIL—Plattner,** for blowpipe analysis 1½ in. by 1½ in. by ½ inch..... **1.00**

136. **ANVIL**—Regular shape, steel face.

Weight, lbs.	8	20	30	40
Length of face, in.	5½	6¼	7¼	8¾
Each	**7.80**	**10.60**	**14.50**	**20.00**

138. **ANVIL**—Square, cast steel, polished face.

Inches	1	2	3	4
Each	**.60**	**1.20**	**2.40**	**3.50**

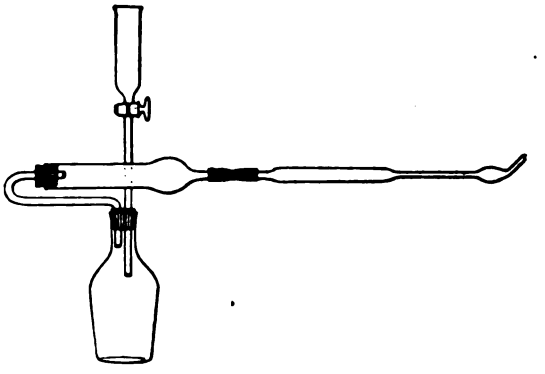
ANAEROBIC CULTURE APPARATUS, see Bacteriological Catalog.

ANATOMICAL JARS—See Jars.

ANIMAL BOARDS, CAGES, HOLDERS, etc.—See Bacteriological Catalog.

ANNEALING CUPS—See Cups.

144



145

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142. **APRON—Laboratory,** of rubber cloth, for protecting the clothes **1.65**

142a. **RUBBER OVER-SLEEVES** .....per pair **.50**

143. **APRON—Asbestos,** canvas lined. Length 40″ x 24″; complete with buckle, fastener, and strap **11.00**

AQUARIA—see Jars.

144. **ARSENIC DETECTION APPARATUS—Gutzeit-Bragg,** all ground joints..... **1.75**
A dilute solution of sulfuric acid is placed in the flask, with a piece of zinc and a small piece of platinum, for generating hydrogen. The hydrogen gas passes up through the lower tube that has four bulbs, which are packed with cotton, alternately saturated with lead acetate for removing sulfuretted hydrogen from the passing gas. The upper or narrow tube is to contain a strip of paper saturated in solution of mercuric bromide. If the passing gas contains arsene, it will leave a yellow stain on the paper.

145. **ARSENIC DETECTION APPARATUS—Fresenius,** with separatory funnel, complete as illustrated..... **3.25**

145/1. **ARSENIC DETECTION APPARATUS—Marsh,** on polished wooden support, complete with glass stopcock..... **3.50**

145/2. **ARSENIC DETERMINATION APPARATUS,** according to **H. V. Farr.** A particularly simple form, easily cleaned and avoiding all contact with rubber connections **4.00**

ARSENIC—Tubes, see Tubes.

146. **ASBESTOS—Sheets,** 40 in. x 40 in. fire and acid proof .....per lb. **.35**

Thickness, inch	1/32	1/16	3/32	1/8	3/16	1/4	3/8	1/2
Approximate weight, lbs.	2	4	6	8	11	14	21	28

148. **ASBESTOS—Mats,** cut in sheets 1/16 in. thick.

Inches	4x4	5x5	6x6	8x8	12x12
Per dozen	.70	.80	1.30	1.80	2.40

148a. **Ditto**—cut in sheets 1/8″ thick.....per doz. **1.40 1.60 2.60 3.60 4.80**

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149. **ASBESTOS—Mats square, ⅛** inch thick, **metal bound,** to prevent fraying at edges.

Size, inches	6x6	8x8	9x13	12x12	15x15	15x25	24x30
Each	.65	.90	1.20	1.30	2.00	2.75	5.00

Other sizes made to order.

150. **ASBESTOS—CLOTH,** 36 inches wide, fire and acid proof.

Thickness	Medium	Heavy
Per square yard	10.00	12.00

152. **ASBESTOS—CORD** or **TWINE,** 1 lb. balls.

Diameter, inch	$\frac{1}{24}$	$\frac{1}{16}$	$\frac{1}{8}$
Per lb.	3.75	3.75	3.75

154. **ASBESTOS—PAPER** ..... per lb. .35

156. **ASBESTOS—WOOD,** much harder than ordinary wood. Acid and fire proof, excellent for insulation purposes. In sheets 36 in. x 48 in.

Thickness, inch	⅛	¼	⅜	½
Per square foot	.25	.50	.75	1.00

158. **ASBESTOS—WOOL,** Fibre, acid washed, for filtering ..... per lb. 3.50

ASBESTOS CEMENT—See Cement.

ASBESTOS GLOVES—See Gloves.

ASBESTOS MASKS—See Masks.

ASPHALT TESTING APPARATUS,—See pages 13-19.

166. **ASPIRATOR—Zinc, japanned,** capacity, 10 liters 13.50

168. **Ditto**—Capacity 20 liters 16.50

170. **ASPIRATOR—Zinc, japanned,** double reservoirs to be reversed for continuous suction. Capacity, 10 liters 18.00

172. **Ditto**—Capacity 20 liters 25.00

ASPIRATOR—WATER, See Pumps.

ASPIRATOR BOTTLES—See Bottles.

ASPIRATOR BULBS,—See Bulbs.

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173. **AUTOCLAVE—Pressure Boiler,** made of heavy cast aluminum; supplied in three different sizes; for laboratory and hospital use; for boiling under pressure, calibrated to about 30 pounds, complete with steam gauge and safety valve and thermometer holder. Full instructions with each autoclave.

Capacity, quarts	10	17	25
Each	**19.00**	**25.00**	**31.00**

173a. **INSTRUCTION BOOK,** when ordered alone ..... **.50**

173/1. **AUTOCLAVE—NATIONAL High Pressure Sterilizer,** used by the American Red Cross, the U. S. Army, and by over 2000 Doctors, Hospitals, and Laboratories. Made of aluminum bronze. Capacity 1350 cu. in., tested for pressure to 30 lbs., height 18″ by 12″ diameter. The cover is made of semi-steel casting with sanitary steam packing, supplied with polished copper crate, 11½x13″, steam safety valve with lever and sliding weight, steam gauge, steam circulating device, and thumb nut wrench, complete without burner or coil **55.00**

173/2. **AS ABOVE** with gasoline burner **70.00**

173/3. **AS ABOVE** with gas burner **70.00**

173/4. **AS ABOVE** with steam coil **70.00**

173/5. **AS ABOVE** with coil and gasoline burner **75.00**

173/6. **AS ABOVE** with coil and gas burner **75.00**

FOR OTHER SIZES SEE BACTERIOLOGICAL CATALOG SECT. II.

For **SHIELDS, ECLIPSE,** and other autoclave sterilizers, etc., see **SECOND** section of our *Bacteriological Catalog.*

If interested in autoclave oven for drying under pressure, communicat with us, giving specifications.

174. **AUTOCLAVE**—*Bronze body with bronze cover,* on heavy iron support with pressure gauge and safety valve; most substantially constructed and carefully tested. Dimensions 125x250 mm. Capacity 3¾ litres. For 25 atmospheres Each..... **185.00**

175. **Ditto**—For 50 atmospheres, each **200.00**

AUTOCLAVE—for the boiling test of cement—see Cement Testing Apparatus.

177

177a

177/1

177. **AUTOCLAVE**—*High Pressure*, tested **hydraulically** to 60 atmospheres or about 1000 lbs. pressure per square inch; with thermometer holder, wrenches, blow-off valve, and gas heating apparatus.

Size	No. 6	No. 8	No. 10
Diam.	6″	8″	10″
Depth	11″	11″	11″
Capacity, liters	8″	12″	16″
Each	**120.00**	**140.00**	**165.00**

177a. **GAS REGULATOR** with iron pipe syphon for above **14.00**

177b. **GAS REGULATOR** with brass syphon for above **16.00**

177c. **TIME REGULATOR** for above **8.00**

177d. **POP SAFETY VALVE SET** for any range to 1000 lbs. **12.00**

177e. **PRESSURE GAUGE** for range to 2000 lbs. **18.00**

The Pressure under which the Pop Safety Valve and Pressure Gauge are to be worked must be given.

177/1. **AUTOCLAVE—Hydrogenation apparatus,** made of heavy copper; the tubes, top, and stirring apparatus with pulley are of brass; clamp is of iron. Total height 8 inches; diameter at bottom 4 inches; for pressures up to about 2 atmospheres **25.00**

Apparatus as used at Columbia University for building up unsaturated oils or other carbon compounds by adding hydrogen or other atoms to the molecule.

179

179/1

179/4

AUTOCLAVES for sterilization, etc., under steam pressure, made of heavy polished copper tin-lined, with seamless bottom, provided with perforated tray and cast brass lid, complete with pressure gauge, safety valve, thermometer, and two-tube burner, on sheet iron base.

THE APPARATUS IS TESTED AND GUARANTEED TO STAND A PRESSURE OF 35 LBS. TO THE SQUARE INCH.

Small size: inside dimensions 12″ deep and 8″ diameter.

		A with removable lid	B with hinged lid
179.	**Gas Heated** ..... each	**68.25**	**72.00**
179/1.	**Oil Heated** ..... each	**73.50**	**77.25**

AUTOCLAVES, same as above, but with quadruple gas burner, etc.

Medium size: inside dimensions 24″ deep and 11″ diameter.

		A with removable lid	B with hinged lid	C nickel plated with hinged lid
179/2.	**Gas Heated** ..... each	**93.75**	**97.50**	**103.50**
179/3.	**Oil Heated** ..... each	**99.00**	**102.75**	**108.75**
179/4.	**Electrically Heated** ..... each	**147.00**	**150.50**	**156.80**

State voltage of current when ordering.

AUTOCLAVES, same as above, with hinged lid, 10 thumb screw clamps, inside tray and extra large, low shape, gas burner.

Large size: inside dimensions, 26″ deep and 14″ diameter.

		A copper	B copper, nickel plated
179/5.	**Gas Heated** ..... each	**121.50**	**127.50**
179/6.	**Oil Heated** ..... each	**126.75**	**132.75**
179/7.	**Electrically Heated** ..... each	**189.00**	**194.60**

State voltage of current when ordering.

BAGS—*Gas,* see Gas Analysis Apparatus.

BAGS—*Paper,* see Paper.

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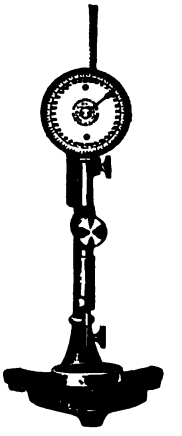

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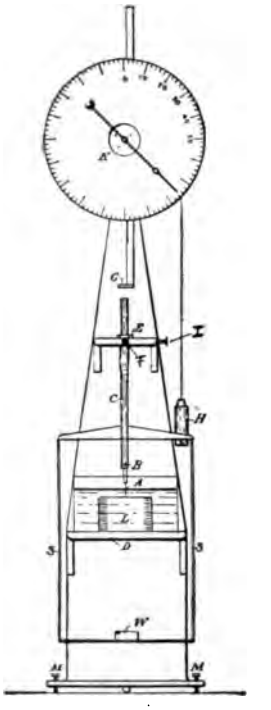

183

Apparatus for the Testing of Bituminous Materials

According to Richardson's "The Modern Asphalt Pavement" (which is the standard book on Asphalt testing) and other texts.

181. **PENETROMETER—New York Testing Laboratory Type** for determining the consistency of asphalt cement or similar material, by determining the depth to which, under a definite load, and during a given time, a standard needle will penetrate. The Penetrometer carries a stop clockwork for timing the duration of the test by half second beats, and on the front a three inch diameter dial graduated to 360 degrees, with a rack and pinion graduated to show 1/10 mm. for every degree on the dial; for force of 50, 100, or 200 grams; full instructions given with apparatus.... **102.50**

181a. **Extra Needles** ..... each **.60**

182. **PENETROMETER**—Similar to No. 181, but **Portable Size.** This instrument is about half the size of No. 181. The needle and bar are standardized to 100 grams using the same needle as is used on the larger instrument **51.50**

182a. **Extra Needles** ..... each **.60**

182/1. **PENETROMETER**—The same general form as No. 181, but with magnetic control, which entirely eliminates personal errors. For operating on 110 volts D. C. or six dry cell batteries—Prices on Application.

182/2. **DITTO**—for A. C. with rectifier.

183. **PENETROMETER—Dow:** operates on same principle as N. Y. T. L. type, but without stop clockwork; for force of 50, 100, or 200 grams; with dial graduated in 100 divisions of 1/10 mm. each **72.50**

183a. **Extra standard tested needles with brass socket** ..... each **.75**

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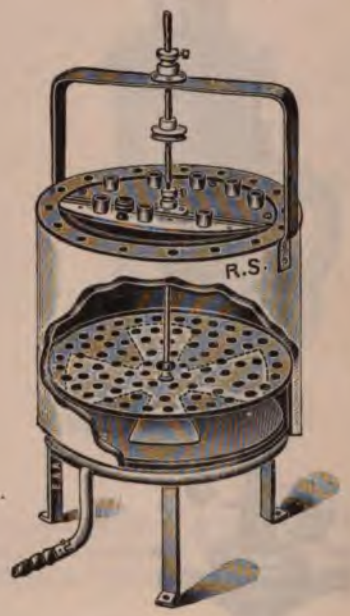

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188. **DRYING OVEN—Freas, Electrically heated and controlled.** This type consists of a No. 100 (E. & A. No. 4816) regular oven equipped with a perforated aluminum revolving shelf, in accordance with the specifications of the A. S. T. M..... **300.00**

190. **OVEN—New York Testing Laboratory Type, of Russian iron,** heated by a ten-inch ring burner immediately underneath the space between the oven itself and the outside wall. The interior of the bath is provided with a fan for circulating air to bring about greater uniformity, this fan being moved by any convenient source of power; without regulator and thermometer **30.00**

191. **DITTO**—Of copper **42.00**

192

192. **EVAPORATOR—Brown** for reducing asphaltic petroleums to asphalt. The apparatus is a decided improvement over the ovens commonly used. Uniform temperatures and strictly comparative results are obtained **69.00**

Bulletin A104 giving exact description of the apparatus and operation of same on request.

193

193/1

The Dulin Rotarex

This machine is widely used for rapid determination of mineral aggregate in Bitulithic, Macadam and ordinary surface mixtures.

The aluminum bowl is fitted with a hollow axle which fits snugly over the shaft. A plate glass top covers the bowl which permits observing the sample at all times. A felt paper ring, 1 inch wide, is placed between the plate glass cover and edge of the aluminum bowl. The cover is held firmly in place by a funnel-shaped screw which engages with the threaded hollow axle. Thru this funnel-shaped screw the solvent is added as needed. A special feature is the small hole extending thru the screw which prevents the receptacle becoming air-bound while being filled. The shaft of the motor projects into a cylindrical metal shell, the bottom of which is so inclined as to drain thru a spout. The bowl is fitted with a two-piece cover, the smaller of which is removed when adding additional solvent.

193. **DULIN ROTAREX—Size No. 1, Capacity 50 grams,** with encased motor which will operate on either D. C. or A. C. 110 volts, 60 cycles, rheostat mounted on base; complete with connecting cord and plug ready for attaching to lamp socket **102.50**

193/1. **Ditto—Size No. 2, Capacity 1000 grams,** complete as above **165.00**

EXTRA PARTS FOR 193 AND 193/1

193a. **FILTER RINGS FOR 50 GRAM BOWL**.....per 100 **3.00**

193b. **FILTER RINGS FOR 100 GRAM BOWL**.....per 100 **4.00**

193c. **PLUG WITH EXTRA SOCKET** for operating Rotarex in series with 110 volt incandescent lamp on 220 volt circuit..... **2.00**

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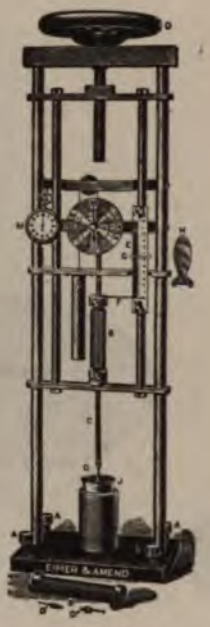


193/3

193/4

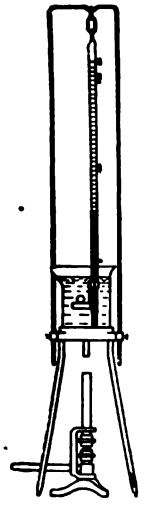
193/2. **ADHESIVEMETER—Brown,** for testing the stickiness or adhesive qualities of oils. Absolute or c.g.s. units for stickiness are determined by the velocity at which a steel rod lubricated by the test oil passes through a bearing under the impulse of a definite force. The apparatus consists of a very heavy cast iron frame mounted on leveling screws, in glass case with electrical heaters **245.00**

193/2a. **Ditto**—without glass case and electrical heaters **170.00**

Bulletin A104 giving exact description of the apparatus and operation of same on request.

193/3. **CONSISTOMETER—Abraham,** to determine the hardness or consistency of bituminous materials, indicating in absolute or c.g.s. units, measuring the weight required to force the plunger through the material at the rate of 1 cm. per minute. 3 Plungers supplied, covering entire range from hard, brittle solids to semi-liquids. Complete as illustrated with method of operation **200.00**

193/4. **RING AND BALL APPARATUS**—according to A. S. T. M., standard method for determining the softening point of bituminous materials other than Tar Products; the Apparatus consists of glass beaker, aluminum rack, two plates for the rings, brass cover with hole for thermometer, 2 brass rings, 2 steel balls, and thermometer. Directions for operation with outfit **15.00**



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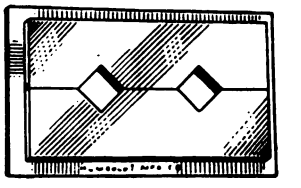

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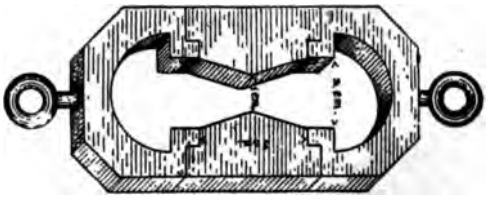


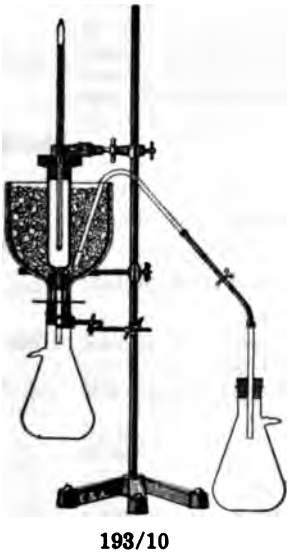
193/8

193/6

193/5. MELTING POINT TESTER—improved type, for determining the melting point of pitch, tar, etc. Simple and efficient; complete apparatus **18.00**

193/5a. CHEMICAL THERMOMETER—for above, reading from 0–250 deg. C..... **2.00**

193/6. BOXES—Seamless tin, for holding asphalt or cement samples .....**doz.** **1.20**



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193/7. BRASS BITUMEN HOLDER—Draper type **4.50**

193/8. BRIQUETTE MOULD FOR ASPHALT **8.00**

193/9. CUBE MOULD—with plate for Bitumens ½ in..... **7.00**

193/10. FREEZING APPARATUS—designed by **Provost Hubbard** for determining the percentage of paraffin scale in bituminous materials; apparatus complete on tripod support, with clamps, inverted bell jar, copper jacket with thermometer, two 50 cc. filter flasks, rubber stoppers, etc. Method of operation with outfit..... **25.00**

193/10a. **THERMOMETER**—for above, **graduated** — 25 deg. C. to 0 deg. C.; the graduation mark — 20 deg. C. is at least 14 cm. from the bulb **6.00**

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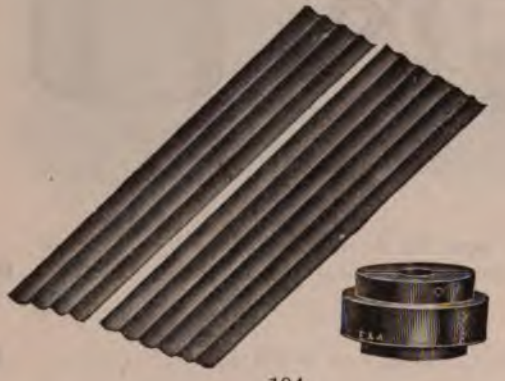


194

4064

194. **ASPHALT FLOW PLATES**—Set consisting of 2 each, with six corrugations and mould **10.00**

196. **Ditto**—Set consisting of 3 each, with four corrugations and mould **10.00**

197. **ADHESION MACHINE—Kirschbraun,** for measuring comparatively the adhesive strength of asphalt as a binder for mineral conglomerates in the construction of roads and pavements. The apparatus is attached to a support with double scale dynamometer reading to 250 grams in 10 gram divisions. A system of gears presses the sample against the ball and then removes it; the scale records the adhesive pull under various conditions of speed and temperature. Complete with 2 sample cups and directions **30.00**

CRUCIBLE—Porcelain, used for the determination of soluble bitumens, see No. 2389.

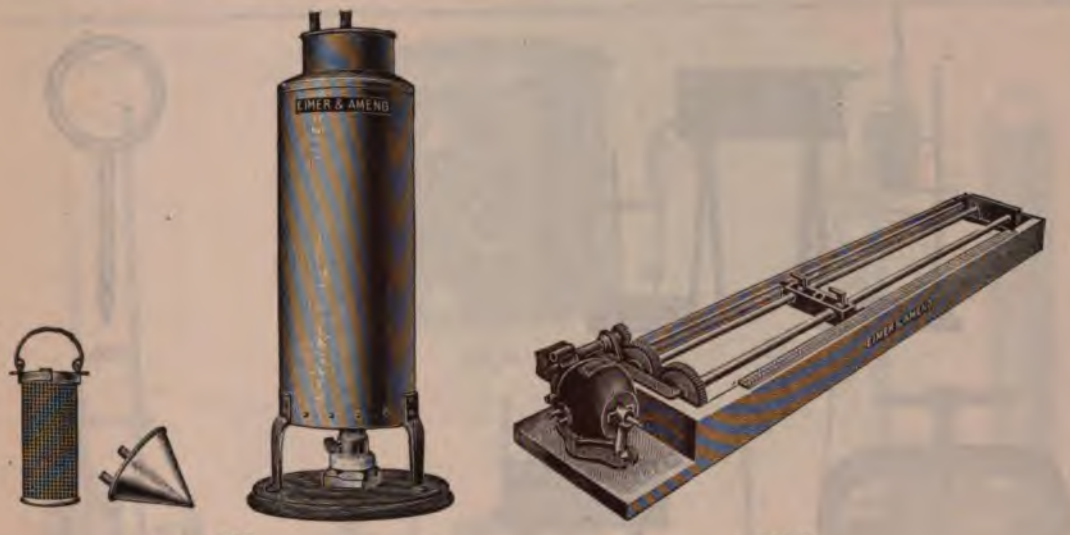
199. **CRUCIBLE—of nickel,** used for the determination of soluble bitumens, same dimensions as No. 2389 ..... **6.00**

200. **CRUCIBLE—Platinum,** special Gooch shape as No. 2389, capacity 30 cc., approximate weight 30 grammes, at market price.

HYDROMETER—Sommer (patented) for determining the specific gravity of asphalt, graduated from 0.85 to 1.3° at 25° C. as recommended by the Committee of the American Society of Civil Engineers. Outfit with brass receptacle and fittings, with instructions. See No. 4064.

HYDROMETER—graduated 0.950 to 1.100°. Complete with receptacle and fittings in case. See No. 4065.

205. **ASPHALT VISCOSIMETER**—The float made of aluminum, standardized with three brass plugs **15.00**



207 208/1

207. **EXTRACTOR—New York Testing Laboratory,** for the analysis of paving mixtures containing broken stone. Made entirely of metal; heated by a 16 C. P. carbon filament lamp; complete as illustrated **54.25**

The bituminous mixture should be warmed until it may be readily broken apart by hand, without fracturing any of the stony particles. Five hundred grams of the disintegrated mixture should be packed as tightly as possible in the wire basket and then covered with a disc of cotton or felt of one-quarter inch to one-half inch thickness.

One hundred and seventy-five to two hundred cc. of carbon disulfide, carbon tetrachloride, chloroform, or benzene is placed in the inside vessel in which the wire basket is suspended.

Cool water should be circulated through the inverted cone condenser, which is also the cover of the apparatus, and is not intended to fit tight. A 500-gram sample of mixture should extract clean with carbon disulfide in about three hours. From 200 to 300 grams of asphalt block or Topeka type mixture is a sufficiently large sample.

After extraction, the solvent and matter removed from the sample during the analysis should be burnt to recover any fine mineral particles which may have passed into the extract.

208. **DUCTILITY MACHINE—Smith, Horizontal Form,** for testing the ductility of bituminous paving cements and binders; pulls ductility up to 100 cm., three briquettes at a time; trough made of alberene stone, very durable. Hand driven.
Price on application

208/1. **Ditto—Electrically driven,** 110 volts D. C. .....**Price on application**

208/2. **Ditto—Electrically driven,** 220 volts D. C. .....**Price on application**

208/3. **Ditto—Electrically driven,** 110 volts A. C. S. P., 60 cycle .....**Price on application**

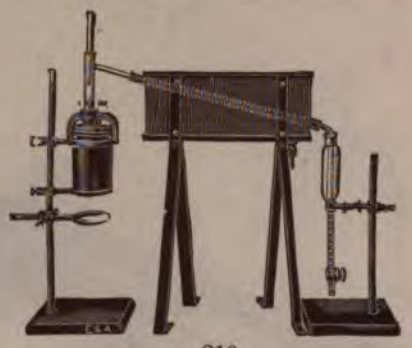
208/4. **Ditto—Electrically driven,** 220 volts A. C. S. P., 60 cycle .....**Price on application**

208a. **EXTRA MOULDS FOR ABOVE** .....**Set of 3** **15.00**

SCALE—For weighing sand, see No. 368.

ASPHALT THERMOMETERS—See Thermometers.

For other Asphalt Testing Apparatus, refer to general catalog classification.



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210c

210a

210g

210i

210e

Apparatus for Testing Coal Tar, and Refined Tars, Oils and Pitches Derived Therefrom. (See Journal of Ind. and Eng. Chemistry, April 1911, March 1913, and May 1914)

210. **DEHYDRATING APPARATUS—for Tars and Creosote Oils** as used in the laboratories of Bituminous Road Materials and the American Society for Testing Materials. The apparatus consists of a copper still with steel clamps 6x3½" i.d., copper condenser trough mounted on iron stand, connecting tube, ring burner, separatory funnel, thermometer and supports with clamp **60.00**

EXTRA PARTS FOR NO. 210

210a. **STILL—of heavy copper,** with steel clamp; 6x3½ inches inside dimensions, thumb screw cover with tubulature for connecting tube, and with 6 paper gaskets..... **25.00**

210b. **Ditto**—larger size, 7½x5 inches inside dimensions **35.00**

210c. **RING BURNER**—for small still **2.75**

210d. **Ditto**—for large still **3.50**

210e. **CONNECTING TUBE—of glass,** small ..... **.50**

210f. **Ditto**—large ..... **.60**

210g. **CONDENSER TROUGH**—of heavy copper, mounted on iron stand **25.00**

210h. **INNER CONDENSER TUBE—of glass**—about 22 inches long ..... **.40**

210i. **SEPARATORY FUNNEL**—for water in tar with stopcock and glass stopper, cap. 120 cc., stem graduated 20 cc. in 1/10 cc. **4.00**

210k. **THERMOMETER**—engraved on stem, graduated 0–400° C. in single degrees, with expansion chamber ring, as per special dimensions **6.00**

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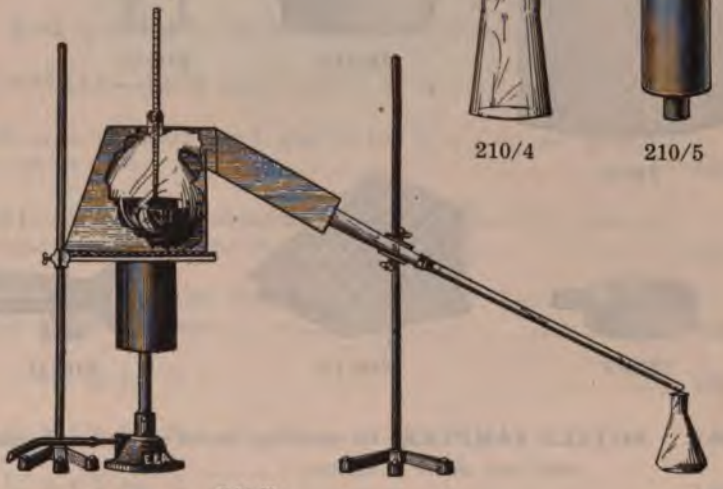
210/3

210/4

210/5



210/2

210/1. **DISTILLATION APPARATUS—for Tars,** consisting of Standard Pyrex Engler flask, iron triangular support with Clamps, Condenser, graduated Cylinder, Bunsen burner, Thermometer, etc. A tin shield with small side hole surrounds the flask and burner as shown in cut, in order to obviate the influence of draft. Complete apparatus as shown, with method of operation **16.00**

210/1a. **CONDENSER FOR ABOVE** **1.60**

b. **DISTILLING FLASK**—250 cc. for above ..... **.68**

c. **THERMOMETER FOR ABOVE**—see No. 210k.

210/2. **DISTILLATION APPARATUS**—for the distillation of creosote according to the specifications of the A. S. T. M. Complete apparatus as shown with method of operation **22.50**

210/2a. **ASBESTOS HOOD**—for above Retort, to prevent radiation and insure a more uniform temperature **5.00**

b. **CONDENSER TUBE**—for above ..... **.75**

c. **RETORT**—250 cc. made according to special dimensions **2.00**

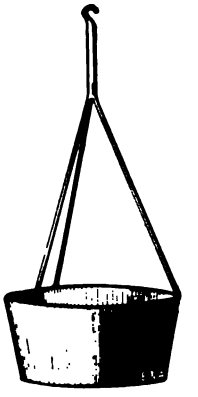
d. **THERMOMETER**—see No. 210k.

210/3. **AIR MELTING POINT OVEN—of copper,** with two mica windows and removable tray **11.00**

210/4. **EXTRACTION APPARATUS—special type,** complete as illustrated with nickel silver wire basket and block tin condenser **5.00**

210/5. **PENETROMETER—Schutte,** with brass plug **5.00**

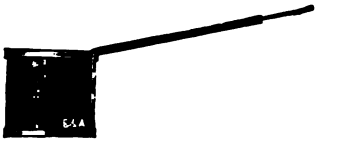
210/6



210/10

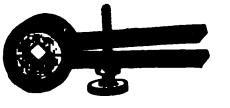
210/13

210/8

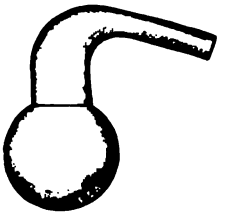


210/9

210/12



210/11



210/14

210/6. **BOTTLE SAMPLER**—for sampling liquids at various depths, made of galvanized iron with lead sinker at bottom **12.00**

210/7. **COPPER CUP**—with long riveted handle, for pitch **4.50**

210/8. **COPPER TEST TUBE—for Solidifying point of Naphthalene,** with long flat riveted handle **5.00**

210/9. **NICKEL DISH**—for evaporation test for pitch **2.25**

210/10. **NICKEL PAN**—for determining the specific gravity of solid and semi-solid fractions of creosote oil **3.00**

210/11. **PITCH MOULD—of brass,** for ½ inch cubes, with iron clamps and brass block..... **5.75**

210/12. **SLIDE BOX—of copper,** with six corrugations **5.25**

210/13. **TAR FILTER TUBE**—well annealed glass, of special dimensions **2.25**

210/14. **COKE BULB**—of **resistance glass,** as per special dimensions ..... **.40**

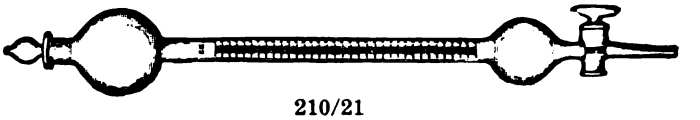
210/15. **DISTILLATION FLASK—for Benzene,** as per special dimensions ..... **.75**

210/16. **DISTILLATION TUBE—Hempel,** for Light Oil Test, as per special dimensions.... **.75**

DISTILLATION FLASK—Hempel, Forest Service, with side tube and constricted neck, see No. 3072.

210/19

210/20



210/21

210/18. **HYDROMETER—shot filled,** grad. 100 to 108 deg. sp. gr. in 1/10 deg..... **2.00**

210/19. **SPECIFIC GRAVITY BOTTLE—special type,** capacity 50 cc..... **2.00**

210/20. **SEPARATORY FUNNEL—for tar acid;** type 1, grad. to 100 cc. in 1 cc., with ground glass stopper and stopcock..... **4.00**

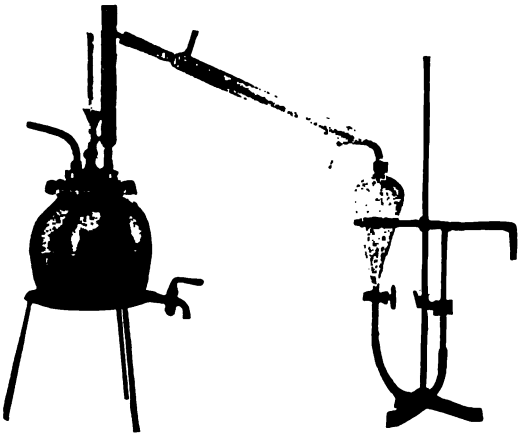
210/21. **SEPARATORY FUNNEL—for acid determination;** type 2, graduated 65 to 100 cc. in 1/5 cc., with ground glass stopper and stopcock..... **9.00**

210/22. **THERMOMETER**—engraved on stem, 0-80 deg. C., in 1/5 deg. C., with expansion chamber ring, as per special dimensions **7.50**

210/23. Ditto— 30 deg.-160 deg. C. in ½ deg. C. **5.00**

210/24. Ditto— 70 deg.-120 deg. C. in 1/5 deg. C. **7.50**

210/25. Ditto—110 deg.-160 deg. C. in 1/5 deg. C. **7.50**



210/26

210/26. **WASH-OIL DISTILLATION APPARATUS**—as used by the **H. Koppers Company,** with brass dephlegmating column, filled with glass beads; very efficient owing to the fractionating carried on in the dephlegmating column. Much purer and sharper boiling products may be separated by the employment of this apparatus. Complete apparatus with brazed-in stopcock near bottom, 1 gal. heavy copper still on iron tripod with clamps.... **75.00**

a—**Dephlegmator only** **6.50**

b—**High grade Thermometer only** **5.00**

210/27. Same as 210/26, but with 3 gal. still **100.00**

DISTILLATION APPARATUS FOR GASOLINE—SEE OIL TESTING APPARATUS.

NOTE

Throughout our long experience in furnishing laboratory equipment, we have specialized on **Balances** and Weights.

In addition to a careful selection of models from other American factories, we are **supplying** "E. & A." Balances and Weights from our own factory. Their lower cost, compared with **goods of** equal quality, especially recommend them to discriminating buyers.

We stock the following

BALANCES

ANALYTICAL
- a. **Regular**
- b. **Chainomatic**

ASSAY

HARVARD TRIP

PRESCRIPTION

PULP

SOLUTION

SPECIFIC GRAVITY
- a. **Westphal**
- b. **Westphal Chainomatic**
- c. **Young's Gravitometers (for solids and for liquids)**

TORSION, VARIOUS MODELS

Etc.

WEIGHTS

ANALYTICAL

ASSAY

ORDINARY

We are also prepared to furnish, at manufacturer's prices, Balances not listed.

Unless indicated in the description, price of balance does not include any weights. **Weights** are listed on pages 47 to 51.

211

212

211. **BALANCE—ANALYTICAL, E. & A. Student Model.** This balance is specially constructed in our own shops. Capacity 200 grams, sensitive to 1/5 mg. Beam 6½ inches, of aluminum, graduated in 5 degree divisions in 1/5th on one side, for 5 mg. rider. Agate knives and planes; specially constructed rest for hangers and pans. Case of polished mahogany with glass on all sides..... **50.00**

212. **BALANCE—ANALYTICAL, E. & A. Model No. 2J.** Capacity 100 grams, sensitive to 1/20th mg. Short aluminum beam graduated on both sides for 5 mg. rider; beam blackened and graduations filled in white, which greatly facilitates the readings; agate knife edges and bearings, with improved hangers and triple arrest raising the hangers from knife edges as well as the beam; extra wide bows and pans to take a four-inch dish; improved arrest for pans with automatic stop; red graduations on the index enabling closer readings; in finely polished mahogany and glass case with drawer, mounted on black glass sub-base plate; with leveling screws..... **95.00**

Model No. 2J, which is our most popular balance, has gained the enviable reputation of being considered equal in rapidity, sensibility and durability to the best models listed at twice its price, representing, as it does, the product of America's foremost balance experts.

216

219

213/1. **BALANCE—Chain-Vernier,** same general construction as No. 212, but equipped with Chain-Vernier, as described under No. 221, with load of 200 grams, sensitive to 1/10 mg., with load of 100 grams, sensitive to 1/20 mg..... **150.00**

WEIGHTS—ANALYTICAL, for Chain-Vernier Balance, see No. 477.

215. **BALANCE—E. & A. MODEL NO. 2E,** the same as Model 2J, but of 200 grams capacity, sensitive to 1/10th mg., with beam divided on both sides for 5 mg. rider.. **100.00**

216. **BALANCE—ANALYTICAL, E. & A. Model No. 2B.** Capacity 100 grams, sensitive to 1/10th mg.

This balance is the same as Model No. 2J, except that it has the usual simple hangers and arrest for beam and is not provided with black glass plate; graduated for 5 mg. rider on one side only..... **80.00**

219. **BALANCE—ANALYTICAL, E. & A. gold plated Model No. 4.** Capacity 200 grams, sensitive to 1/20 mg. Short beam, gold plated, except the graduated part which is blackened and graduations filled in white which greatly facilitates the readings. Graduated on both sides for use with 10 mg. rider, agate knife edges and bearings, pans 2⅝ inches diameter, width of pan support 4 inches, improved arrest for pans with automatic stop. In polished mahogany and glass case, mounted on black glass plate; all metal parts heavily gold plated, except beam support..... **160.00**

220

221

220. **BALANCE—ANALYTICAL, Becker Model No. 8A.** Capacity 200 grams, sensitive to 1/20th mg. Short beam, graduated on both sides for use with 6 mg. rider, agate knife edges and bearings, improved arrest for pans with automatic stop, pans 2⅜ in. diameter, width of pan support 4 inches; in polished mahogany and glass case mounted on heavy glass base; with riders, specific gravity support and weighing tube support **150.00**

221. **BALANCE—ANALYTICAL, CHAIN VERNIER, Becker No. 8A.** Capacity 200 grams. Sensitive to 1/20th mg. Similar to E. & A. No. 220, but with Chain-Vernier. The graduated scale and vernier are finished in dull black with white graduations and figures **190.00**

221/1. **Ditto—gold plated pillar, pans, etc.,** except beam **200.00**

WEIGHTS—ANALYTICAL, for Chain-Vernier Balance, see No. 477.

For cheaper model of the above see No. 213/1.

THE MARKED ADVANTAGES OF THE CHAIN-VERNIER SYSTEM HAVE QUICKLY BEEN REALIZED BY INDUSTRIAL CHEMISTS AND EDUCATIONAL AND RESEARCH LABORATORY WORKERS. THE FINAL WEIGHING BELOW 50 MGS. IS ACCOMPLISHED BY THE USE OF A SMALL GOLD CHAIN SUSPENDED AT ONE END FROM AN ADJUSTABLE SCREW FITTED TO THE BEAM OF THE BALANCE, THEREBY ELIMINATING THE CUSTOMARY TROUBLESOME RIDERS AND SMALL FRACTION WEIGHTS, ALLOWING MORE ACCURATE WEIGHINGS TO BE MADE WITH GREATER RAPIDITY.

226

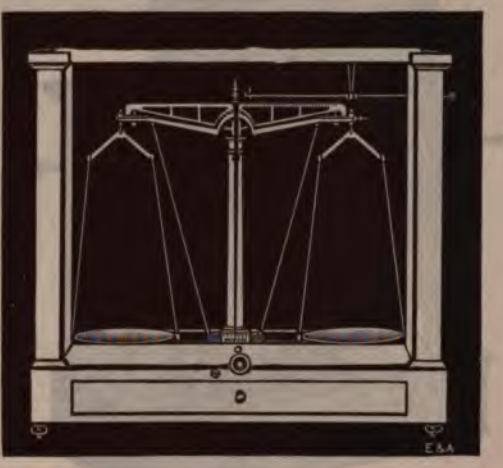
228

226. **BALANCE—ANALYTICAL, TROEMNER Model No. 10. Capacity 200 grams, sensitive to 1/20th mg.** Short aluminum beam, graduated on both sides in 1/10th mg. for use with 5 mg. rider; agate knives and bearings; bows and pans of aluminum; all other metal parts gold plated; in polished mahogany and glass case, mounted on heavy glass base plate **220.00**

228. **BALANCE—ANALYTICAL, AINSWORTH,** with improved Multiple Rider Carrier. Capacity 200 grams, sensitive to 1/20th mg. Capacity of carrier 1000 mg. Beam 6 inch, of hard rolled nickel aluminum, agate knife edges and bearings, pan supports, etc.; in polished mahogany and glass case with counter-poised sliding door; dimensions of case 20x20x10 inches **275.00**

The Multiple Rider Carrier, which facilitates rapid weighing, eliminates the use of small fraction weights. Each rider is carried on a separate arm a short distance above the bar on the stirrup; all that is necessary to transfer the rider from the arm to the stirrup is to move the operating rod until the number on the index stands opposite the pointer, then revolve the rod slightly. When the weighing is finished, a glance at the numbers on the arms that are down shows the combined weight of the riders used; a slight turn resets them all simultaneously.

230



245

230. **BALANCE—ANALYTICAL, E. & A., Portable Model. Capacity 75 grams, sensitive to 1/10th mg.** Aluminum beam graduated on both sides for use with 5 mg. rider; agate knives and bearings; bows are 3⅝ in. wide; pans 2 inches in diameter. In polished mahogany and glass case with leather covered carrying case fitted with lock and key; 12 in. wide, 7 in. deep, 14½ in. high. Gross carrying weight 12 pounds. Complete with set of first quality weights, 10 grams down to 1 mg. and riders **130.00**

245. **BALANCE—ANALYTICAL,** large capacity, suitable for calibration work, 500 grams, sensitive to 1/10 mg. long beam, rider arrangement, agate knife edges and bearings, independent arrest for pans with automatic stop, in polished mahogany and glass case **250.00**

256

247. **BALANCE**—similar to above, capacity 1000 grams, sensitive to 1/10 mg..... **300.00**

249. **BALANCE**—similar to No. 245, capacity 2000 grams, sensitive to 1/10 mg..... **400.00**

256. **BALANCE—ANALYTICAL,** for carbon tests in steel, agate knives and bearings, front frame in two parts, counterpoised so that when top pan is used, the upper part of frame can be lowered; when lower pans are used the lower part of the frame can be raised..... **75.00**

270

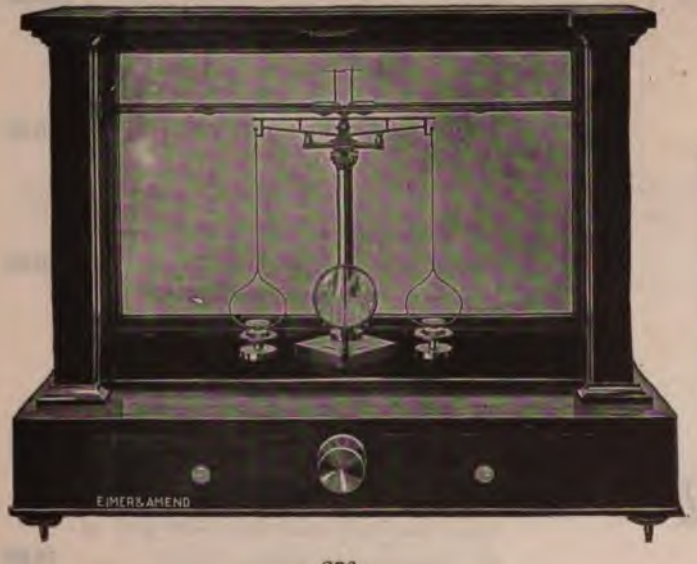
274

ASSAY BALANCES

270. **BALANCE—ASSAY, E. & A. Gold plated Model No. 12B, sensitive to 1/200th mg.** Short light beam with 100 divisions on each side of centre knife. Agate knife edges and planes, hangers and pans of aluminum, other metal parts gold plated, adjustable magnifying lenses for reading the graduations on beam and ivory scale; in polished mahogany and glass case, mounted on black glass base plate..... **215.**

This Assay Balance, on account of its extreme sensitiveness and excellent construction, has given the greatest satisfaction to numerous assayers and in the laboratories of prominent mining schools.

274. **BALANCE—ASSAY, Model 1C, sensitive to 1/50 mg.** Can be charged up to 25 grams in each pan. Deviation of needle on scale 20 divisions for one milligram. Agate knives and bearings; in polished mahogany and glass case..... **100.**



276

276. **BALANCE—ASSAY, Ainsworth Model H, sensitive to 1/100th mg.** An excellent button balance with all the latest improvements, including improved rider apparatus and fallaway pan rests. Short Beam with 50 divisions on each side of centre knife. Agate knives and bearings, and star wheel adjustment, polished mahogany and glass case with plate glass sub-base. Dimensions 20x17x10 inches ..... **185.**

280

280. **BALANCE—ASSAY, E. & A. Model 20C, sensitive to 1/500th mg.,** of the dwarf-column fallaway type with triple movement. Beam 5 inches long, of hard rolled alloy not affected by magnetism nor temperature; 100 divisions each side of centre knife. Agate knives and bearings; all metal parts not oxidized are heavily gold plated. The pointer or indicator points upwards, and for 1/20th mg. indicates 5 divisions. French polished old mahogany case with black glass plate base. Dimensions 16½ in. long, 15½ in. high, 9 in. wide. **500.00**

282

286

282. **BALANCE—Assay and Pulp, E. & A. Portable Outfit. Assay Balance sensitive to 1/100 mg.,** Pulp Balance sensitive to one mg. The Assay Balance beam of a hard metal is 5 inches long, and graduated on the right into fifty divisions. Polished mahogany case with drawer large enough to accommodate the beam, hangers, etc.

The Pulp Balance is very compact, beam 5 in. long, pans 2½ in. diameter, capacity 150 grams, with drawer. The carrying case is of mahogany, and measures 12½x11½x6 inches. Weight, complete with balances, 9½ lbs., with one set of first quality weights 1 gram down to 1/10th mg., and one set of A. T. weights, one A. T. down to 1/20th A. T. **170.00**

284. **BALANCE—Assay, E. & A. Portable.** This Balance is the portable assay described in outfit No. 282. Carrying case measures 12½x8½x6 in. Complete with set of first quality weights 1 gram down to 1/10th mg. **155.00**

292

294

286. **BALANCE—Assay, Pocket,** shows 4 divisions for 1 mg., when closed measures 6 inches long, 2¾ in. wide and 1½ in. deep. Complete in case, with set of weights 10 grams to 1 mg. **30.00**

For cut see preceding page.

BALANCE—for Blowpipe Analysis—see No. 853/3.

MEDIUM GRADE BALANCES FOR GENERAL LABORATORY WORK

292. **BALANCES—Pulp,** for ore, pulp, sugar, etc., in glass and mahogany case with drawer and counterpoised door; beam support, levelling screws, and removable pans, with steel knives and *agate* planes.

CAPACITY	SENSIBILITY	DIAM. OF PANS	
75 grams	1 mg.	6.5 cm.	**34.00**
180 grams	1 mg.	8.0 cm.	**40.00**
300 grams	2 mg.	10.0 cm.	**52.50**
600 grams	2 mg.	12.5 cm.	**63.00**
1500 grams	5 mg.	15.0 cm.	**80.00**

294. **Ditto**—without glass case, for ore, pulp, sugar, etc., on polished mahogany box with drawer; beam support, levelling screws, and removable pans, with steel knives and *agate* planes.

CAPACITY	SENSIBILITY	DIAM. OF PANS	
75 grams	1 mg.	6.5 cm.	**20.50**
180 grams	1 mg.	8.0 cm.	**25.50**
300 grams	2 mg.	10.0 cm.	**35.50**
600 grams	2 mg.	12.5 cm.	**42.00**
1500 grams	5 mg.	15.0 cm.	**52.00**

The above pulp balances are carefully constructed under our own supervision. We invite your particular attention to the *agate* planes, which insure sensibility for a longer period than the steel planes, as ordinarily supplied. Carefully ground steel knife edges are used, as these are less liable than agate to chip with the work for which pulp balances are generally used.

295

297

295. **BALANCE—Laboratory,** large capacity, beam arrest, leveling screws, spirit level, removable pans, steel knives and bearings, mounted on polished mahogany box with drawer.

CAPACITY	SENSIBILITY	DIAM. OF PANS	
650 grams	10 mg	5 inches	**65.00**
1500 grams	25 mg	6 inches	**75.00**
3000 grams	25 mg	6 inches	**95.00**
6000 grams	25 mg	8 inches	**115.00**
10000 grams	50 mg	8 inches	**125.00**

297. **BALANCE—Platform Counter,** with full capacity beam, which assures exceptional speed in weighing. No loose weights. Each reading given directly, size of platform 10½x12", upper bar is graduated 5 lbs. x 1 oz., the lower 50x5 lbs. Capacity 55 lbs. x 1 oz. **24.00**

328

328. **BALANCE—Prescription,** mounted on polished walnut box, in the drawer of which it can be packed, including set of weights ½ grain to 2 drams. Length of beam 5¾ inches. Diameter of pans 2 inches **6.00**

328/1. **Ditto**—Length of beam 7". Diameter of pans 2½"... **8.50**

328/2. **Ditto**—Length of beam 8". Diameter of pans 2¾"... **10.50**

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330. **BALANCE—Triple Beam, E. & A. Improved,** capacity 111 grams **22.50**

This balance possesses many improvements over the ordinary type. The usual index scale is supplanted by small tongues, which quickly show the balancing of the beam. Hardened steel Pivots and Planes are employed instead of those of cast iron, and hardened steel Friction Plates in place of the usual brass ones. The correct point of gravity on each aluminum beam is carefully ascertained; consequently, the balance easily responds to 1 centigram. The balance is substantially constructed and well finished.

332. **BALANCE—Harvard Trip Scale,** with porcelain plates 6 inches square, upright indicator, side beams graduated to 5 grams by 1/10th with sliding weight. Capacity 1 kilo. **10.00**

334. **Ditto—with agate bearings** **14.00**

335. **BALANCE—Trip Scale, Harvard design,** similar to No. 332, but with round porcelain plates 5½″ in diameter, upright indicator, beam graduated to 10 grams in 1/10 gram divisions with sliding weight. The capacity of the scale is 2000 grams, sensitive to 1/10 g. **12.00**

335/1. **Ditto—with agate bearings** **15.00**

336. **BALANCE—Roberwahl, American make,** for course weighings.

Capacity, lbs.	1	2	5
Diameter of pans, inches	5½	8	9
Each	**12.00**	**13.25**	**16.00**

338. **BALANCE—Box Scale,** fine finish, in ebony box with marble top, gilt dial, nickel plated pans.

Capacity of each pan, lbs.	5	8	10
Diameter of pans, inches	7	8	9
Each	**24.00**	**27.75**	**31.50**

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344–346

339. **BALANCE—Chemical and Drug Scale, useful to Manufacturing Chemists, etc.,** for weighing costly drugs, essential oils, etc. Capacity 14 Kilos (30 lbs.). Sensitiveness 1/3 g. (5 grains). Plates 10″ diameter. Arrest for quick weighing..... **60.00**

340. **BALANCE—Torsion Glass Box Scale,** capacity 120 g. = 4 oz.; sensitiveness, 2 mg. = 1/32 grain; pans, nickel silver; diameter 3 in.; rider beam, upper graduation 8 grains by ⅛ grain, lower, 5½ decigrams by 5 mg.; or if specified 500 mg. by 5 mg. or 10 grains by 1/10 grain. Arrest for quick weighing. Extensively used for prescription and laboratory work **60.00**

342. **BALANCE—Torsion Glass Box Scale,** capacity, 4½ kilos = 10 lbs.; sensitiveness, 1/5 g. = 3 grains; brass pans, nickel plated, 9 in. diameter; slide beam, 8 oz. by ⅛ oz., or if specified, 225 g. by 2½ g., or 100 g. by 1 g.; external slide weight mover. Arrest for quick weighing. Invaluable for heavy routine work in industrial and college laboratories **60.00**

343. **BALANCE—Torsion Glass Box Scale,** capacity, 4½ kilos = 10 lbs.; sensitiveness, 1/15 g. = 1 grain; brass pans, nickel plates, 8 in. diameter. Arrest for quick weighing **65.00**

343/1. **BALANCE**—With slide beam, 8 oz. by ⅛ oz., or if specified, 100 g. by 1 g. or 10 g. by 1/10th g. **70.00**

344. **BALANCE—Torsion,** capacity 10 lbs., sensitive to 5 grains, nickel plated brass pans 9 in. diameter; *slide beam, with 3 graduations,* reading avoirdupois—16 oz. by ¼ oz., troy—14½ oz. by 2 pwts., metric—450 g. by 5 g. Arrest for quick weighing..... **34.00**

346. **BALANCE—Torsion,** capacity, 4½ kilos = 10 lbs.; sensitiveness, 1/3 g. = 5 grains; brass pans, nickel plated, 9 in. diameter; slide beam, 16 oz. by ¼ oz., or if specified, 500 g. by 5 g.; black Japan finish. Arrest for quick weighing..... **30.00**

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347. **BALANCE—Torsion,** capacity, 1 kilo = 2 lbs.; sensitiveness 1/15 g. = 1 grain; porcelain plates, 6 in. diameter, slide beam, 10 g. by 1/10th g., or if specified, 8 oz. by ⅛ oz. or 100 g. by 1 g.; black Japan finish. Arrest for quick weighing. Suitable for Soil work, etc. **35.00**

349. **BALANCE—Torsion,** capacity 2 kilos = 5 lbs.; sensitiveness, ⅛ g. = 2 grains; brass pans, nickel plated, 6 in. diameter; slide beam, 8 oz. by ⅛ oz., or if specified, 100 g. by 1 g.; black Japan finish. Arrest for quick weighing. Containers may be tared by sliding weight on upper beam, facilitating weighing **32.00**

350. **BALANCE—Torsion—Queen Laboratory Scale,** capacity, 1 kilo = 2 lbs.; sensitiveness 1/15 g. = 1 grain; porcelain plates, 6 in. diameter; slide beam, 10 g. by 1/10th g., or if specified, 8 oz. by ⅛ oz. or 100 g. by 1 g.; black Japan finish..... **22.00**

352. **BALANCE—Dispensing,** capacity 4 oz., sensitive to 1 grain, with sliding weight on graduated slide beam, nickel plated movable pans 3¾ in. diameter, beam divided into 120 divisions, each division representing one grain; an extra row of metric divisions is placed on bottom edge of beam, each representing one décigram. Platform is attached to base of scale in which is fitted a set of solid brass troy weights, 2 oz. and down **15.00**

354. **Ditto**—with set of metric weights, 50 g. down **15.00**

356. **BALANCE—Laboratory Scale,** capacity 12 ozs., sensitive to 1 grain; nickel plated movable pans 6 in. diameter. Platform is attached to base of scale in which is fitted set of brass Troy weights 8 oz. down..... **17.00**

358. **Ditto**—with set of metric weights..... **17.00**

360

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360. **BALANCE—Bakers Scale,** capacity 210 grams, sensitive to 1/10 gram. Pans 5 inches in diameter, beam graduated to 5 grams and divided into 1/10 gram, with sliding weights, and set of brass weights fastened to the front of the scale..... **18.00**

362. **BALANCE—Metric Solution Scale,** capacity 1 kilo, sensitive to ½ gram. Movable brass pans 5½ inches in diameter, slide beam in front undivided, with sliding weight for balancing the bottle or container, including set of brass weights fastened in front of the scale..... **36.00**

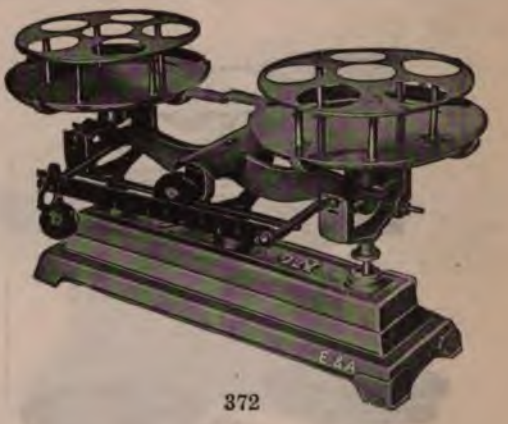
364. **Ditto**—capacity 5 kilos, diameter of pan, 9 inches **42.00**

365. **BALANCE—Solution Scale,** used for making solutions, weighing animals, bottles, etc., Capacity 2 Kilos (5 lbs.). Sensitiveness 1/3 gram (5 grains). Nickel plated brass pans 6″ diameter. Arrest for quick weighing **31.00**

365/1. **Ditto**—capacity 4½ Kilos (10 lbs.). Sensitiveness 1/3 gram (5 grains). Nickel plated brass pans 9″ diameter. Arrest for quick weighing **36.00**

366. **BALANCE—Solution Scale,** capacity 20 kilos, provided with two weighing beams and sliding poises, one of them divided into 100 parts, each part representing 1 gram; the other beam divided into ten parts, each part representing 100 grams. A sliding counterpoise is placed under the weighing beam for balancing the empty bottle container **75.00**

368



372

368. **BALANCE—Sand Scale** for estimating the quantity of the various sizes of sand; beam graduated 50 grams in 100 parts representing percents **12.00**

370. **BALANCE—Cement Scale,** for testing fineness of cement; same as No. 368, but beam graduated upper row 16x½ ounces, lower row 0-100% **12.00**

371. **BALANCE—Cement Scale,** to show the fineness of cement. Capacity 1 lb. by 1-10,000 lb. The fineness of a sample of cement is determined by weighing the residue retained on certain sieves. The test should be made with 50 grams of cement dried at a temperature of 100°C (212° F.) (appearance of balance like 373) **16.00**

372. **BALANCE—Cream Testing,** designed to weigh 12 bottles at one time. Slide beam is divided into 12 parts, each part representing 9 grams; a balance beam to take care of the bottles is also provided. Has agate bearings and is rust proof, being entirely galvanized **22.00**

373

373. **BALANCE—for Paper or Yarn,** will weigh one pound by tenths of grains or one seventy-thousandth part of one pound avoirdupois; also useful for the weighing of small articles, colors, drugs, etc.; for computation of large quantities; or for postal scales. Finished parts are nickel plated. The stand is japanned and lacquered. Ten balancing weights accompany each scale, one each of 20, 30, 50, 100, 200, 300, 500, 1000, 2000, and 3000 grains. The 20 grains on the beam are each divided into ten parts. Base has level and adjusting screw **16.00**

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374. **BALANCE—Babcock Cream Test Scale,** capacity, 1 bottle; sensitiveness, 8 mg. = ⅛ grain; white enamel finish. Arrest for quick weighing. Price with one 9-gram and one 18-gram weight **30.00**

375. **Ditto**—capacity, 4 bottles; sensitiveness, 8 mg. = ⅛ grain; white enamel finish. Arrest for quick weighing **34.00**

376. **BALANCE—Grain Testing,** capacity, 1 kilo = 2 pounds; sensitiveness, 1/15 gram = 1 grain; scoop, 10½ by 5½ by 2½ inches; slide beam, 10 grams by 1/10th gram; black Japan finish. High Poise. Arrest for quick weighing. Price, including brass block weights, 100 grams to 5 grams **35.50**

Designed according to suggestion of the U. S. Department of Agriculture expressly for the determination of moisture in grain, according to Bulletin No. 99, Bureau of Plant Industry, entitled, "A Quick Method for the Determination of Moisture in Grain."

376/1. **BALANCE—Grain Tester,** the beam to give the weight per bushel direct, with polished brass measure to hold the grain.

Capacity	½ pint	1 quart	2 quarts
Each	**15.00**	**20.00**	**22.00**

377. **BALANCE—Seed Testing,** capacity, 120 grams = 4 ounces; sensitiveness, 2 mg. = 1/32 grain; scoop, 4 by 2½ by 1½ inches; nickel silver pan, 3 inches diameter; rider beam, 1 g. by 1/100 g., or if specified 500 mg. by 5 mg. Arrest for quick weighing. Case of metal and glass **65.00**

Designed for seed analysts, and for acidity test of corn. See page 3 of Bulletin No. 102 U. S. Department of Agriculture, "Acidity as a Factor in Determining the Degree of Soundness of Corn."

378

379

379a

379b–c

378. **BALANCE—Moisture,** capacity, 120 grams; sensitiveness, 13 milligrams; pans, 3 inches diameter; slide beam, 10% by 1/10%, 20% by 2/10%; white enamel finish. Arrest for quick weighing. Price with 10-gram weight **35.00**

Provided with percentage beams, so that 0.1 per cent. to 30 per cent. of moisture can be determined without calculation when 10-gram samples of material are used. By means of two tare beams one or more dishes can be balanced and recorded. Used extensively for butter testing, also in paint and varnish laboratories.

379. **BALANCE—Cloth Calculating, sensitiveness 6.5 mg. = 1/10 grain;** sample carrier, 140 centimeters by 2 centimeters = 60 in. by 1 in.; slide beam, upper 1,000 grams by 5 grams, lower 36 ounces by 2/10 ounce. Price, including 2 by 2 inch Die and 2-pound Mallet **70.00**

To ascertain the exact weight in ounces or grams of a running yard or meter of cloth of any width without calculation or use of weights.

379a. **BALANCE—Cotton Cloth Calculating, sensitiveness 4 mg. = 1/15 grain;** sample carrier, 50 inches by 1 inch. Price, including 3 by 3 inch Die and 2-pound Mallet.... **70.00**

To ascertain the number of yards per pound of fabric of any width without calculation or use of weights.

379b. **BALANCE—Cotton Yarn, Calculating, sensitiveness, 2 mg. = 1/32 grain;** aluminum pan, 3 inches diameter. Price, including folding wind-shield **80.00**

To ascertain the yarn number of cotton yarn without calculation or use of weights.

379c. **BALANCE—Woolen and Worsted Yarn Calculating, sensitiveness, 2 mg. = 1/32 grain;** aluminum pan, 3 inches diameter. Price, including folding wind-shield..... **80.00**

To ascertain the yarn number of woolen and worsted yarn without calculation or use of weights.

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380. **BALANCE—Moisture,** for assayers, smelters, etc., to determine the percentage of moisture or sulfur in ores; upper row of figures gives weight in ounces, etc.; the lower row gives percentage 100 to 0; including weights 2 pounds down **18.00**

382. **BALANCE—Solder Testing,** for instantly ascertaining the percentage of tin in solder; complete with mould **66.00**

It is only necessary to make a cast of the material in the mould, placing this on the pan of the scale and move the weight out along the beam, until the scale balances, which will show the percentage of tin from 0 to 100%. On the back of beam is a scale to show percentage of antimony in material known to be made up of lead and antimony. The scale is substantially and accurately made, with agate bearings.

There is provided with the scale a brass weight marked 50, to be used to adjust the scale. Place this weight on the scale pan and move the beam weight out along the beam to 50, and if the scale does not balance at this point the 50% weight, screw in or out, as the case may require, the adjusting screw on the end of beam directly over the pan until the balance is secure.

383. **BALANCE**—designed in accordance with the suggestion of the **U. S. Dept. of Agric.,** to determine weight per bushel test, dockage test, also weight for moisture test. Capacity 1 kilo (2 lbs.). Sensitiveness 1/15 g. (1 grain). Brass scoop 17 x 8 x 4 in.

2 graduated slide beams:

Upper beam—10 grams by 1/10 gram.

Lower beam—{ 0-150 grams by 1 gram.
0-15%.
0-10 lbs. per bushel by 1/10 lb. **40.00**

Brass Measure, 1 qt. dry only **5.00**

Set of 6 Brass Weights for the above:—
10 20 30 40 50 60 lbs. per bushel.
Price **10.00**

Set of Brass Weights for the above:—
1000 500 200 200 100 grams.
Price **8.00**

383/1. **BALANCE—specially designed for weighing colors, dyestuffs, etc.** Capacity 500 g. (1 lb.) sensitiveness 1/15 g. (1 grain) brass scoop 7½x3 inches, with 2 graduated slide beams. The upper 1 oz. by 1/100, the lower 16 oz. by ¼. Arrest for quick weighing. Price **40.00**

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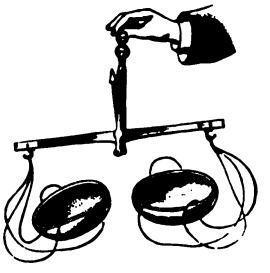
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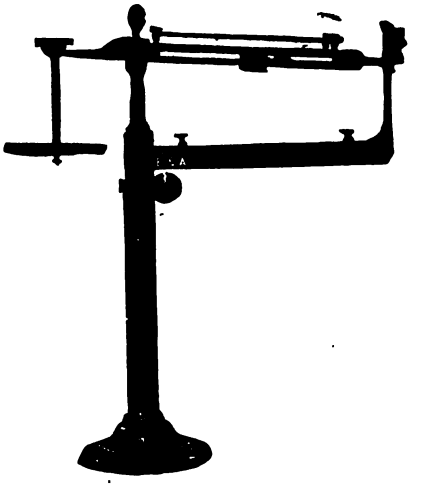
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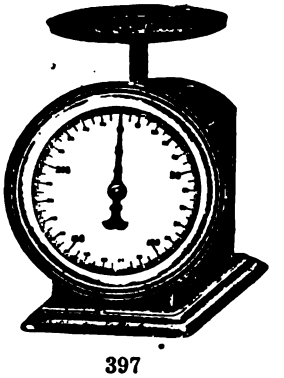
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384. **BALANCE—Spring, new style,** brass front, nickel plated; capacity 8 ozs. by ½ oz. on one side of index, 250 grams by 10 grams on other side **1.35**

385. **SAME AS ABOVE**—with flat back and broad pointer, for use in either perpendicular or horizontal position **1.75**

389. **BALANCE—Spring, cylindrical, brass nickel-plated.**

Capacity, lbs.	10x¼	20x½	60x½
Length, inches	4⅜	4⅜	9½
Each	**2.50**	**2.50**	**5.50**

392. **BALANCE—Hand Scales, brass,** with horn pans; best make.

Length of beam, inches	4	5	6	6½	7½
Each	**3.00**	**3.50**	**5.00**	**6.50**	**8.50**

394. **BALANCE—The "Even Balance" Scale,** with agate bearings, marble base, and dial with large figures and plain graduations. This balance is most accurate and sensitive, and for laboratory purposes is most serviceable for quickly weighing out solids and liquids; the increase in weight is gradually shown, as a solid or liquid is poured into the receptacle, the tare of which is also quickly determined. Capacity 2 kilos in 10 grams **33.00**

396. **Ditto**—Capacity 5 kilos in 25 grams **33.00**

397. **Ditto**—Capacity 250 grams in 1 gram, same general style as No. 394, but with pan above dial as illustrated **9.00**

398. **BALANCE—Candle.** Used in determining the time required to burn a given number of grains of candle during photometric tests. With the balance is furnished a set of three twenty-grain weights **75.00**

406

407

YOUNG'S GRAVITOMETERS

FOR SOLIDS AND FOR SOLUTIONS

406. **BALANCE—Specific Gravity, Young's Gravitometer** (Patented) *for solids,* in polished mahogany and glass case. Made in our own factory **80.00**

This is a specific gravity balance for solids, which are insoluble in water. It reads specific gravity directly, without calculations or the use of weights. The operation is extremely simple and requires no experience whatever.

The scale is graduated to read direct specific gravities from 0.9 to 10.0. It is accurate to the second decimal place, between 0.9 and 2.0.

Young's Gravitometer is of special importance in the industries, as it allows of a great many determinations being made daily, without the possibility of an error which so frequently happens in the use of balances requiring small separate weights and calculations, especially in the hands of industrial workers not accustomed to using such delicate apparatus. The balance is especially adapted for the rubber manufacturer, it being possible to determine accurately and quickly the specific gravity of all his products.

Hundreds are in use in the various Rubber Laboratories, the numerous repeat orders attesting its popularity.

407. **BALANCE—Specific Gravity, Young's Gravitometer** (Patented) *for liquids,* in polished mahogany and glass case. Complete with weights and glass cylinder **80.00**

The Gravitometer for Liquids shows specific gravities of liquids to the third decimal place, on a direct reading scale. The regular range is 0.600 to 2.000.

Determinations are carried out speedily and accurately. Not more than one weight is used at a time, and only one place to hang it. There is no sliding of riders along a beam. All possibility of error in reading, so common in balances of the Westphal type, is eliminated.

The Gravitometer consists of a beam balanced on delicate knife edges and provided with a specially adjusted pointer, a carefully tested glass plummet, and a specially made scale.

This support is fitted into a wooden base, which is covered with a glass plate to protect it from acids and which contains a drawer to hold the weights, etc. For the range 0.600 to 0.700 no weight is required, but a different weight is furnished for each 0.100 degree gravity additional; hence for the regular range 0.600 to 2.000 there are 14 weights stamped .7, .8, .9, etc. The second and third decimal places are shown on the scale. A cylinder marked at 50 cc. and 100 cc. is furnished for containing the liquid.

Gravitometers for Liquids are calibrated at 15° C.

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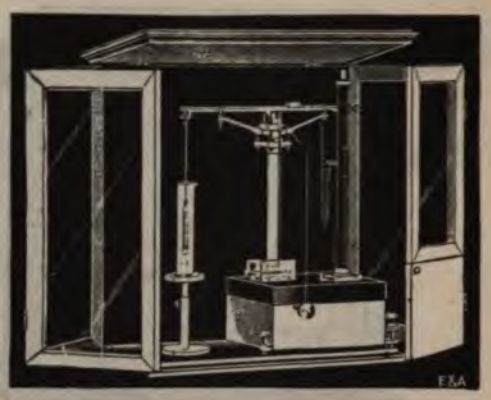

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408. **BALANCE—SPECIFIC GRAVITY, Torsion,** complete with bottle **65.00**

This balance reads specific gravity directly, and thereby avoids the use of small fractional weights; furthermore no calculations are necessary.

Range 0.7000 to 1.4000, accurate to the fourth decimal place.

The bottle, which is of special design, holds exactly 100 cc. at 15° C. It has a wide neck, which permits the bottle to be easily filled, rapidly emptied, and thoroughly cleaned, while its size permits the use of small samples. The stopper of the bottle has a depression in the top, therefore, if the temperature of the room should rise beyond the normal, the liquid will flow into this depression.

The balance is especially desirable for determining the specific gravity of thick sticky liquids, such as glue, asphalt, varnish, vaseline, condensed milk, tar, tomato pulp, etc.

408/1. **Ditto—without bottle** **60.00**

408a. **Extra bottle for above** **5.00**

411. **BALANCE—SPECIFIC GRAVITY, Chainomatic,** for liquids, automatic in principle, no weights nor riders, graduated scale giving direct readings in specific gravity. Case of special design, with glass front, and glass slides adjustable, reduces air disturbances to a minimum, at the same time insures freedom in operating the balance. *Plummet displaces exactly 2 grams of distilled water at 15°C.* Ranging to 2.0000, to the 4th decimal place **100.00**

418

411/1. **BALANCE**—similar to above, ranging to 3.500, to the 3rd decimal place **100.00**

Extra Thermometer Plummet **10.00**

418. **BALANCE—SPECIFIC GRAVITY, Westphal for liquids,** range 0.700 to 2.000 sp. gr., with thermometer plummet, set of rider weights; in polished hinged box **30.00**

Extra thermometer plummet **6.00**

Extra set of rider weights .....**per set** **3.00**

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429. **BALANCE—Specific Gravity, Jolly spiral spring, improved design,** reversible spring support for light and heavy loads. Mirror attached to the sliding index for easily collimating the horizontal pointer with scale reading on nickel plated upright, graduated in millimeters. Sliding index may be attached to platform for work in adhesion or surface tension **30.00**

429a. **Extra lower scale pan, of aluminum,** with copper wires ..... **.60**

b. **Extra upper scale pan, of aluminum,** with copper wires ..... **.60**

c. **Extra lower scale pan, of glass,** with platinum wires **1.80**

d. **Extra Spring, light** ..... **.90**

e. **Extra Spring, heavy** ..... **.90**

429/1. **BALANCE—SPECIFIC GRAVITY, Jolly,** with *Vernier* attachment, with telescoping tubes, the inner one of which is graduated and is caused to move upward or downward by means of a rack and pinion operated by thumb screw at the side. The outer tube is equipped at the top with a Vernier, beyond which the scale of the inner tube passes, enabling the instrument to be read to 1/10 of a millimeter.... **50.00**

430. **BALANCED WATCH GLASSES**—without handles, accurately adjusted for analytical work.

Diameter, inches	2½	3
Per pair	**1.35**	**1.35**

432. **BALANCE PANS**—glass with handles.

Diameter, inches	2½	3
Per pair	**1.35**	**1.35**

438. **BALANCE**—Desiccator of stout glass, to fit into the corner of balance case..... **1.50**

440. **WEIGHING SCOOP—of glass flat bottom,** with spout, diameter 2½ inches..... **.75**

444. **WEIGHING SCOOP AND COUNTERPOISE**—scoop of aluminum with lip, capacity 10 cc. **1.75**

446. **Ditto**—Capacity about 30 cc. **2.00**

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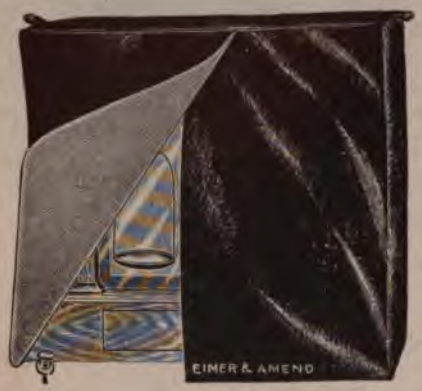

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448. **WEIGHING TUBE SUPPORT**—nickel plated; can also be used in horizontal position **3.00**

450. **BALANCE RESTS**—glass, to place under levelling screws of balances. Per set of 4.. **.60**

452. **INDEX MAGNIFYING LENS**—with double jointed support **9.00**

454. **SPIRIT LEVELS**—circular, brass frame, diameter, 1 inch **6.00**

458. **BALANCE COVERS**—of rubber sheeting. Made to order of any size **2.00**

460. **WALL BRACKET SUPPORT FOR ANALYTICAL BALANCE**—with drawer and key; table surface, 60x35 cm..... **12.00**

A wall bracket has the advantage over a table, in that being suspended from a wall, it is less exposed to vibration, and thus greatly facilitates the process of weighing.

462

462. **OPAL PLATE FOR FRACTION WEIGHTS.** These plates are very desirable for placing inside the balance case, so that any shortage of fraction weights can readily be observed. Size 3⅝x1¾ in. with eight cavities, each figured in black with the designation of the fraction it is to accommodate..... **.75**

470

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Weights—First Quality

470. **WEIGHTS—Analytical E. & A.** The gram weights are of brass heavily lacquered, the fraction weights of platinum, except below 20 mg., which are of aluminum. With riders and forceps in polished mahogany box, hinged lid lined with velvet.

1 mg., to grams	20	50	100	200	500	1000
Per set	**21.00**	**22.00**	**24.00**	**30.00**	**48.00**	**58.00**

471. **WEIGHTS—Analytical E. & A. special,** adjusted to the highest accuracy. Similar to No. 470 but with Bureau of Standard Certificate.

1 mg., to grams	50	100
Per set	**50.00**	**60.00**

These are the only weights which we supply with B. of S. Certificate.

472. **WEIGHTS—Analytical, E. & A. Triple gold plated,** same as No. 470, but heavily gold plated.

1 mg., to grams	50	100	200
Per set	**25.00**	**28.00**	**37.00**

476. **WEIGHTS—Analytical—First Quality,** lacquered brass, in mahogany box **with removable cover.**

1 mg., to grams	20	50	100	200
Per set	**37.50**	**39.75**	**42.00**	**45.00**

477. **WEIGHTS—Analytical, for Chain-Vernier Balance.**

50 mg. to 50 grams ..... set **34.50**
50 " " 100 " ..... set **37.50**

478. **WEIGHTS—Analytical, E. & A. Triple gold plated,** set 20 grams to 1 mg. in polished mahogany block, fractions under glass, without forceps **18.00**

This is a special compact set designed for keeping on the glass plate of the balance, to avoid losing the fractions when transferring them to the balance pans.

479. **WEIGHTS—Analytical,** lacquered brass with square aluminum fraction weights with two riders and forceps, in polished mahogany box with hinged lid, lined with velvet. The weights will be found quite suitable for students' analytical requirements.

1 mg., to grams	50	100	200
Per set	**14.50**	**16.00**	**20.00**

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480. **WEIGHTS—Analytical,** 1 gram to 1 mg., all of aluminum; in polished case with hinged cover **7.00**

482. **Ditto—but of platinum** above 20 mg., in polished case with hinged cover **16.50**

484. **WEIGHTS—Analytical,** fractions, first quality.

	Made of aluminum					Made of platinum			
Mg.	1	2	5	10	20	50	100	200	500
Each	**.40**	**.40**	**.40**	**.45**	**.45**	**1.20**	**1.50**	**2.00**	**4.00**

485. **WEIGHTS—Analytical,** fractions, all of aluminum, correct to 1/10 mg.

Mg.	1	2	5	10	20	50	100	200	500
Each	**.35**	**.35**	**.35**	**.40**	**.40**	**.60**	**.60**	**.60**	**.60**

486. **WEIGHTS—Riders**—first quality.

Mg.	.5	1	1.2	2	5	6	10	12
Each	**.70**	**.60**	**.65**	**.60**	**.35**	**.35**	**.35**	**.35**

488. **BLACK POLISHED BLOCKS (empty)** for fraction weights 500-1 mg. Very convenient for keeping fraction weights in the balance near the pans **60.00**

489. **WEIGHTS—Factor,** for rapid iron and steel determination.

Carbon Factor,	2.7281	Grams Brass	**2.00**
½ Carbon Factor,	1.3640	Grams Brass	**2.00**
¼ Silicon Factor,	1.1733	Grams Brass	**2.00**
1/10 Silicon Factor,	0.4693	Grams Platinum	**5.00**
1/10 Silicon Factor,	0.4702	Grams Aluminum	**2.00**
Phosphorus Factor,	1.63	Grams Brass, if precipitation is made according to Blair (1.64, to order only).	**2.00**

490. **WEIGHTS—Normal Sugar, square form.**

Set of two, 13 and 26 grams in box	**10.00**
Set of three, 13, 26, and 52 grams in box	**14.00**
Single weight, 13 g	**4.00**
Single weight, 26 g	**4.00**
Single weight, 52 g	**4.00**

492. **WEIGHTS—Normal Sugar, round form.**

Set of two, 13.024 and 26.048	**7.00**
Set of three, 13.024, 26.048 and 52.096	**8.50**
Single weight, 13.024	**2.50**
Single weight, 26.048	**2.50**
Single weight, 52.096	**2.50**

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494. WEIGHTS—Assay Ton, first quality, in mahogany case with hinged cover.

1/20 AT to	1 AT	2 AT	4 AT
Per set	**6.00**	**9.00**	**12.00**

496. WEIGHTS—Assay, first quality, platinum, one gram to 1/10th mg., in ebony box, hinged lid **47.00**

498. WEIGHTS—Assay, first quality, 10 g. to 1/10 mg.; gram weights are of brass lacquered, fractions of platinum **54.00**

500. WEIGHTS—Assay, *for silver assaying;* sheet silver weights, 1 gram to 1 mg. and 6-10 mg. riders, in ivory case with screw lid **30.00**

502. WEIGHTS—Assay, *for gold assaying;* sheet gold weights, ½ gram and its subdivisions in 1000 parts **30.00**

504. WEIGHTS—Brass, polished wooden velvet lined case, with forceps, fraction weights under glass cover. These weights are of medium grade, and are highly recommended for use with pulp balances, by students, and for general prescription work.

1 mg., to grams	20	50	100	200	500	1000
Per set	**5.50**	**6.25**	**7.50**	**8.75**	**11.50**	**13.50**

506. Ditto—in polished wooden block.

1 mg., to grams	20	50	100	200	500	1000
Per set	**4.75**	**5.50**	**6.75**	**8.00**	**10.75**	**12.50**

508. WEIGHTS—Brass, single, same quality as above sets.

Grams	1	2	5	10	20	50
Each	**.20**	**.20**	**.25**	**.30**	**.35**	**.60**
Grams		100	200	500	1000	2000
Each		**.80**	**1.20**	**2.00**	**3.50**	**6.00**

510. WEIGHTS—Fractions, Nickel silver, 1, 2, 5, 10, 20, 50, 100, 200, and 500 mg. per dozen **1.20**

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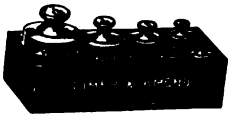

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512. WEIGHTS—Set of 500 to 1 mg. in sliding cover plain wooden box, with forceps and separate space for each weight ..... **per set 2.00**

516. WEIGHTS—for coarse weighing, brass, covered wooden box. These are good weights, slightly less accurate than those above listed under Nos. 504 and 506.

20 grams	to 1 centigram	per set	3.50
50 "	to 1 centigram	per set	4.00
100 "	to 1 centigram	per set	4.50
200 "	to 1 centigram	per set	5.50
500 "	to 1 gram	per set	9.00
1000 "	to 1 gram	per set	13.00
2000 "	to 1 gram	per set	16.50
5000 "	to 1 gram	per set	35.00

517. WEIGHTS—Brass, single, for above.

Grams	1	2	5	10	20	50
Each	.14	.15	.16	.24	.30	.50
Grams	100	200	500	1000	2000	5000
Each	.70	1.00	1.50	3.00	5.50	12.00

518. WEIGHTS—Iron, hexagonal in shape, except two largest. These weights are inaccurate and should be used for rough weighing only.

10 grams up to; kilos	1	2	5	10
Per set	2.00	3.00	8.00	14.00

520. WEIGHTS—Avoirdupois, solid brass, ordinary quality, in wooden block. These weights are of good grade for ordinary weighing.

1/16 oz. up to; pounds	1	2	4
Per set	9.00	13.00	16.50

521. WEIGHTS—Avoirdupois fractions of ounces, of nickel-silver, ¼ oz. down to 1/128 avoirdupois ounce ..... **per set 3.50**

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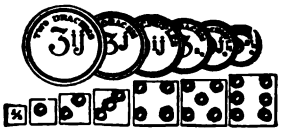

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522. **WEIGHTS—Avoirdupois, brass,** in nests. Good grade weights.

¼ oz. up to; pounds	1	2	4
Per set	**3.35**	**4.00**	**8.25**

524. **WEIGHTS—Avoirdupois, iron,** in nests. These weights are inaccurate and should be used for rough weighing only.

½ oz. up to; pounds	1	2	4	8
Per set	**1.25**	**2.00**	**3.00**	**5.00**

526. **WEIGHTS—Troy,** (ozs., pwts., grs.). Brass, best quality, in polished mahogany boxes.

¼ grain to; ozs.	1	5	10	20	50
Per set	**6.00**	**12.00**	**16.00**	**26.00**	**35.00**

526/1. **WEIGHTS—Brass,** in polished mahogany box, velvet lined, set 1000 grains to 1/10 grain .....per set **15.00**

528. **WEIGHTS—Troy,** (ozs., pwts., grs.) solid brass, in wooden block. These weights are of good grade for ordinary weighing.

½ grain up to; ozs.	1	2	5	10	20
Per set	**3.50**	**5.00**	**6.00**	**7.50**	**14.00**

530. **WEIGHTS—Apothecaries,** ½ grain to 2 drams. .....per set **1.10**

530/1. **SINGLE weights of above set.** According to size.....**45 to 18 cents each**

532. **WEIGHTS—Troy,** ½ grain to 1 oz., small weights nickel-silver, larger ones of brass... per set **1.00**

534. **WEIGHTS—Troy, aluminum wire,** 5 grains to ½ grain .....per set **.80**

536. **WEIGHTS—Troy, aluminum, square,** 10 grains to ½ grain .....per set **.90**

536/1. **WEIGHTS—Single weights of above set** .....each **.27**

537. **WEIGHTS—Prescription,** coin weights of brass, grain weights of aluminum, in mahogany box, with hinged lid and forceps, 300 grains to 1/10 grain .....per set **3.60**

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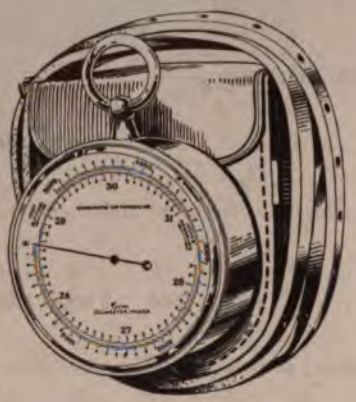

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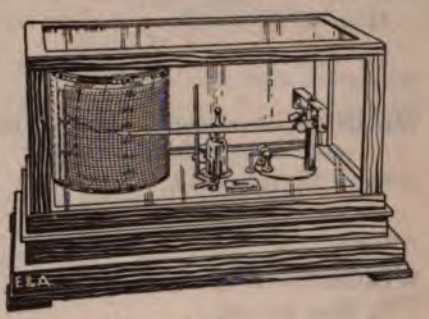

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540. **BAROMETER—Aneroid** in brass case with open porcelain dial, visible works. Diam. 5 in. **12.25**

542. **Ditto**—Diam. 6 in. **13.50**

543. **BAROMETER—Aneroid,** in brass case, specially finished movement, compensated for temperature, silvered open metal dial, divided to 0.02″, diameter 5 inches **20.00**

543/1. **Ditto**—Diam. 6 in. **25.00**

544. **BAROMETER—Aneroid,** with patent revolving back, adjustable for any latitude up to 3500 ft. The adjustment is very simple, and no derangement of the working parts is necessary. In brass case 5 inch diameter, porcelain dial **16.25**

544/1. **Ditto**—Compensated, Diam. 5 in. **21.75**

546. **BAROMETER—Aneroid, watch form,** for pocket, 1¾ inch diameter, silvered metal dial with fixed altitude scale 8000 ft. in 50 ft. divisions, compensated for temperature; in fine morocco case **27.00**

546/1. **BAROMETER**—same as above, but 16,000 ft. altitude scale in 100 ft. divisions **32.00**

546/2. **BAROMETER—Aneroid,** for altitude, revolving scale reading to 10,000 feet, aluminum case in leather sling carrying case **30.75**

547. **BAROMETER—Aneroid,** *"Cyclo-Stormograph,"* latest device for automatically registering weather changes, mounted in polished mahogany case with glass cover, complete with weekly charts enough for one year **54.00**

Description with each instrument.

550 556-562 564 566 568

548. **BAROMETER—Bunsen Syphon,** plain tube only, unfilled **2.50**

550. **Ditto**—graduated in millimeters, the tube only **4.50**

552. **Ditto**—graduated in millimeters, filled with mercury **15.00**

554. **Ditto**—graduated in millimeters, filled with mercury, on support **18.00**

We pack mercury filled Barometers with the utmost care; notwithstanding this, they are liable to damage in transit. Wherever possible, send messenger.

556. **BAROMETER—United States Signal Service,** high grade black oxidized finish, silver deposited figures, tube ¼ in. bore, engraved stem thermometer. Total length 39 in. For use in any altitude from sea level to 3000 ft. Graduated in mm., vernier 1/10 mm., without board **80.00**

556/1. **Ditto—E. & A.** **50.00**

558. **Ditto**—graduated in inches, vernier 1/100th inch, without board **80.00**

558/1. **Ditto—E. & A.** **50.00**

560. **Ditto**—Graduated in inches and mm., without board **88.00**

560/1. **Ditto—E. & A.** **55.00**

562. **OAK BOARD—with opal glass reflectors,** suspension hook and steadying screws for any of above barometers **11.00**

562/1. **Ditto—E. & A.** **8.00**

564. **BAROMETER—Mercurial, for school use,** black oxidized finish, sliding scale to allow for changing level of mercury in cistern, screw attachment for blocking the mercury. Graduated in inches and mm. with double vernier; complete on oak board with **F. & C. thermometer** **27.00**

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566. **BAROMETER—School,** graduated in inches and 1/10ths; on oak frame with thermometer. For cut, see preceding page **18.00**

568. **BAROMETER—Syphon, new form,** with absolutely tight patent stopcocks, graduated in ½ mm., easily filled or emptied. For cut, see preceding page. Price unfilled.. **18.00**

BAROMETER—Tubes—see Tubes.

BATTERIES

572. **BATTERY—Bunsen,** with rolled zincs. Best adapted for open circuit work for operation of induction coils, motors, electrolysis of water, etc.

Capacity	1 quart	½ gal.	1 gal.
Size of jar, inches	4½x5	5x6	6x8
Complete	**2.60**	**3.20**	**4.20**
Jar	**.50**	**.55**	**.60**
Porous cup	**.24**	**.30**	**.40**
Carbon	**.10**	**.20**	**.30**
Zinc and connection	**1.50**	**1.80**	**2.40**

576. **BATTERY—Daniel.** Good Primary Battery for both open and closed circuit work.

Complete	**3.60**
Glass Jar 6x8 inches	**.60**
Porous Cup	**.40**
Copper	**1.20**
Zinc	**1.00**
Zinc Clamp	**.20**

578. **BATTERY—Crowfoot**

Size of Jar, inches	6x8	5x7
Complete	**1.70**	**1.30**
Jar	**.60**	**.50**
Zinc	**.90**	**.60**
Copper	**.20**	**.20**

580. **BATTERY—Nickel Plating.** An improved Bunsen cell of great power, for electric plating, etc.

Complete	**8.50**
Jar	**3.00**
Porous Cup	**1.00**
Zinc	**3.00**
Zinc connector	**.30**
Carbon	**1.00**
Carbon Clamp, platinum faced	**1.20**

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582. **BATTERY—Edison, new Primary Type 200.** Capacity 200 amp. hrs., complete cell with rectangular glass jar 3½x6x11¼" **3.30**

Zinc Oxide Assembled Plates	**1.90**
Can Caustic Soda	**.24**
Bottle special battery oil	**.09**
Jar	**1.75**
Cover	**.45**
Nuts and washers ..... per set	**.25**

583. **BATTERY—Columbia, Type 72, High Voltage Cell,** rectangular shape used for all closed or open circuit work. This cell is self-oiling and does not require the handling of any oil. It has also a twenty per cent higher working voltage than any other Caustic Soda cell obtainable. Can be used to advantage for electroplating, electric clocks, dental engines, and for laboratory and school work.

	300 Amp. hr. Cell	500 Amp. hr. Cell	600 Amp. hr. Cell
Complete with jar	**4.64**	**6.04**	**6.60**
Renewal Parts			
Complete without Jar and Cover	**2.40**	**3.28**	**3.64**
Heat Resisting Jar. *Size* 300 Amp. hr. 2⅞x5¼x10 in., 500 & 600 Amp. hr. 5x6x10 in.	**1.86**	**2.50**	**2.50**
Can of Caustic Soda	**.28**	**.40**	**.40**
Porcelain Cover	**.36**	**.40**	**.40**
Terminal Wing Nuts and Washers Per cell	**.24**	**.24**	**.24**
Zinc plates ..... each	**.50**	**.60**	**.70**
Large Wing Nuts	...	**.10**	**.10**
Hexagonal Jamb Nuts	...	**.05**	**.05**
Brass Washers	...	**.05**	**.05**

583/1. **Battery Trays—of steel,** for 3, 4, and 5 cells. (Jars not included in price.)

For cells	3	4	5
Each	**2.50**	**2.75**	**3.00**

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592. **BATTERY—Columbia Red Label Dry Cell, No. 6.** This Battery is recommended for general purposes with exception of heavy drain ignition ..... **.55**

593. **BATTERY—Columbia IGNITOR.** This Battery design is specially for use on heavy drain ignition service ..... **.45**

593/1. **BATTERY—Columbia Hot-Shot.** This Battery is composed of a number of selected dry cells in a moisture proof fibre case and is intended for heavy duty service.

Range, volts	4½	6	7½	9
Each	**2.10**	**2.70**	**3.25**	**3.90**

593/2. **BATTERY—Columbia Multiple, type 356.** This battery consists of a number of dry cells set up in water-tight casing, used for low voltage machines such as Electric Vibrators, gas and oil engines, etc. **11.00**

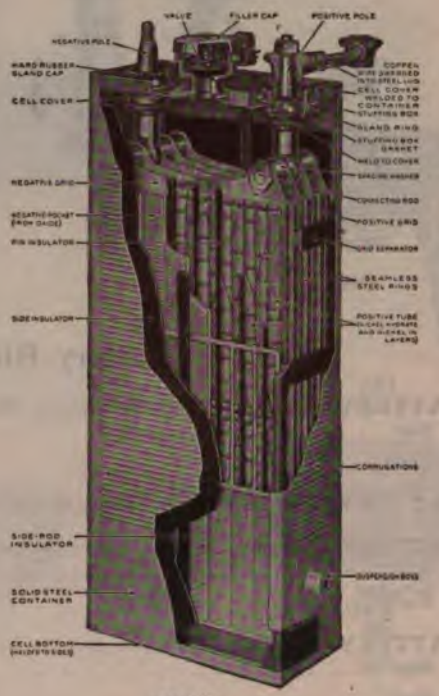
593/3. **BATTERY—Carbon Plates.** These plates are made from high quality carbon and are especially adapted for use in acid batteries.

Sizes, inches		12x12	12x15	15x18
Thickness, in.	¼ Each	**1.55**	**2.00**	**2.80**
	⅜ Each	**1.80**	**2.25**	**3.20**
	½ Each	**1.90**	**2.35**	**3.50**
	⅝ Each	**2.05**	**2.60**	**3.85**
	¾ Each	**2.15**	**2.75**	**4.10**

Other thicknesses can be furnished up to 3 inches; Prices on application.

593/4. **BATTERY—Columbia Storage,** composed of negative plates of spongy lead and positive plates of lead peroxide immersed in a solution of sulphuric acid of 1.28 specific gravity. The plates are separated with wood insertions of excellent strength and very fine porosity. The cell container is made of hard rubber, light in weight and durable. There is a definite guaranty that the battery will retain at least 80% of the original capacity at the end of one year's time. The spacing between the plates and in each cell is unusually large, thus affording considerable reserve power due to the fact that more active material and electrolyte can be retained within these spaces. For cut, see next page.

593/4



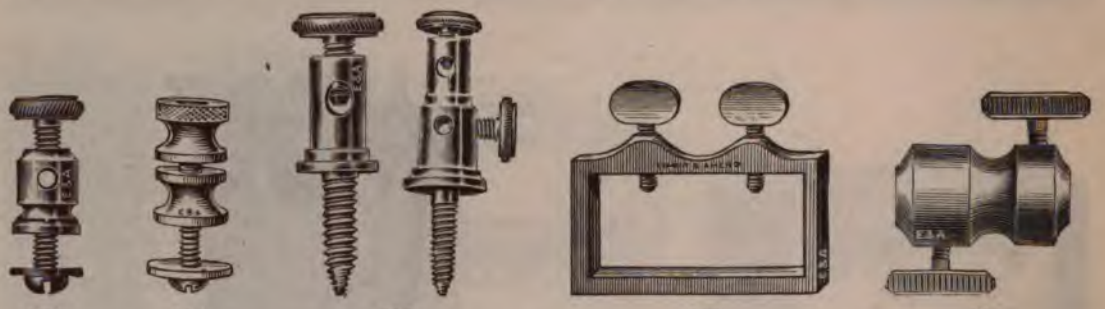
593/5

593/4. **CONTINUED:—**

Battery Voltage	Battery Type 3 Cells	**Overall** Outside Dimensions, Including Handles. Inches			Wght. Lbs. Net	**Amp. Hr. Capacity** When Discharged At Rate of			Price Complete
		Long	Wide	High		1-Amp.	5-Amp.	10-Amp.	
6	LD 35 A.	7⅜	7¼	8⅞	21	30	25	22	23.00
6	LD 37 V.	8¼	7¼	7	25	50	37.5	30	27.75
6	LD 39 A.	7½	7¼	8⅞	34	70	54	45	32.50
6	LD 311 A.	8⅞	7¼	8⅞	41	90	70	60	37.25
6	LD 313 A.	10 3/16	7¼	8⅞	48	110	85	75	42.00
6	LD 315 A.	11½	7¼	8⅞	53	130	102.5	90	46.75
6	LD 319 A.	14 1/16	7¼	8⅞	69	170	135	125	56.25

593/5. **BATTERY—Edison Storage,** composed of negative plates of iron oxide and positive plates of nickel oxide immersed in an alkaline solution. The Cell container is made of nickel plated sheet steel light in weight, and durable. The battery is practicable, has very long life, can be short circuited or charged in the reverse direction with no injury.

Type B-4
Rated Capacity Amp. hrs. 75
Discharge Rate (5 hr.) Amps. 15.0
Average discharge voltage (5 hrs.) 1.2
Price .....per cell 11.75



602 604 606 608 610

Battery Binding Posts

602. **BATTERY—Binding Posts, American Pattern.**

Size	Small	Medium	Large
Each	.15	.20	.25

604. **BATTERY—Binding Posts, English pattern,** medium size ..... **.30**

606. **BATTERY—Binding Posts,** with wood screw.

Size	for 1 wire	for 2 wires
Each	.20	.25

608. **BATTERY—Binding Posts,** for Bunsen battery carbons.

Size	single	double
Each	.30	.40

610. **BATTERY—Connectors.**

Size	single	double
Each	.15	.20

Baths

612 616 618

612. **BATH—Air, Asbestos,** round for flasks.

Diameter, inches	3½	4¼	5½	6½
Each	1.40	2.00	2.40	2.70

614. **Ditto**—The set of four **8.50**

BATH—Air Drying—see Ovens.

616. **BATH—Sand, Iron, deep form,** hemispherical.

Diameter, inches	3	4	5	6	8	10
Each	.09	.12	.20	.26	.50	1.00
Dozen	1.00	1.30	2.20	2.90	5.50	11.00

618. **BATH—Sand, tinned iron,** shallow.

Diameter, inches	3	3½	4½	5	6	6¾
Each	.04	.06	.08	.09	.10	.12
Dozen	.40	.60	.80	.90	1.00	1.20

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620. **BATH—Sand, Russian sheet iron,** shallow. These baths make excellent sampling pans.

Diameter, inches	2½	3	4	5	6	8	10
Each	.09	.10	.12	.16	.20	.37	.75
Dozen	.90	1.00	1.30	1.75	2.20	4.00	8.00

622. **BATH—Sand,** of cast iron. Size 11x17¾ inches, with 3 rows of burners, adjustable in height **23.60**

624. **BATH—Sand,** or hot plate, mounted on removable legs.

Size, inches	9x9	12x14
Each	4.00	5.00

BATH—Wasserman, see Bacteriological catalog, section 2.

BATH—Water, see also Heaters.

626. **BATH—Water,** heavy polished Copper, tin lined, with handles, steam escape, and concentric copper rings with cover.

Diameter, inches	4	5	6	8	10	12
Each	1.45	1.70	2.35	3.65	7.00	12.25

628. **Ditto**—fitted with Kekule constant water level.

Diameter, inches	5	6	8	10
Each	3.10	3.85	5.15	8.50

630. **Ditto**—with Kekule water level, and tripod.

Diameter, inches	5	6	8	10
Each	3.40	4.15	5.50	8.95

632. **BATH—Water,** for heating by steam. Copper, shape as No. 626, but fitted with steam valve and waste pipe.

Diameter, inches	6	8	10
Each	6.00	7.35	10.75

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633. **BATH—Water, polished copper,** tin lined, funnel shape, with concentric copper rings, cover and constant water level, with tripod.

Diameter, inches	6	8
No. of rings, including cover	5	7
Each	**5.70**	**7.85**

641. **BATH—Water, polished copper,** tinned inside, with concentric copper rings and cover, constant water level arrangement, and wire enclosed safety support for use with inflammable liquids. Size, 6 inches diameter **22.75**

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642. **BATH—Water,** stout polished copper, diameter at top 8 in., total height 5 in.; with handles, concentric copper rings and cover; also plate provided with five holes of different sizes, each with cover; and constant level arrangement **18.40**

644. **Ditto—with tripod** **19.00**

648. **BATH—Water, heavy polished copper,** tin lined, with concentric copper rings, and extra plate perforated for test tubes, etc. Steam escape and flange to fit on tripod, with tripod.

Diameter, inches	6	8
Each	**5.45**	**8.75**

648/1. **BATH—Water, of polished copper,** cylindrical, Army Medical School Model with offset bottom; 3 inches high, 7¾ in. diameter, to hold 18 Test Tubes, with tubulation for thermometer and side tubulation for filling, diameter of perforations in top 22 mm., diameter of perforations in removable false bottom 12 mm., complete with tripod.. **6.20**

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648/2. **BATH—Water, of polished copper,** tin lined, with concentric rings, water level regulator and tripod, size 6 in. diameter by 4 inches deep **8.75**

648/3. **BATH—Water level Regulator, brass,** for constant supply; can be attached to any of our baths; the level of water is regulated by adjusting the centre brass tube, size 3½ inches **2.20**

648/4. **SAME AS ABOVE,** but larger size, 4½ inches **3.10**

648/5. **BATH—Water, Whipple,** for melting gelatine. This bath provides a ready means for quickly melting the gelatine in tubes. The water in the bath is kept heated to the required temperature for quickly melting the gelatine by means of an electric lamp, arranged as shown in illustration. Size 12 inches diameter, 5 inches deep, made of heavy copper, tinned inside, with rack to accommodate 48 tubes. Openings ¾ inch. **21.00**

649. **BATH—Water,** large, round, heavy polished copper, tin-lined, on removable iron stand, with 6 openings, five—3 inches diameter and one—6 inches diameter; with concentric copper rings and cover; with stopcock and water level. Size is 16 inches diameter, 4 inches deep, and 13 inches high, including stand **28.00**

650. **BATH—Water, rectangular, for dissolving steel samples,** heavy copper 7½x7½x6½ inches high, with galvanized iron tray with handles to hold 25 test tubes 8x⅞ inches; mounted on heavy iron support **11.00**

652. **Ditto**—Smaller size, 6x4½x7 inches high, with galvanized iron tray to hold 12 test tubes 8x⅞ inch **7.50**

654. **BATH—Water, round, for dissolving steel samples,** heavy copper, tin lined, 6 inches diameter, 7 inches high, with galvanized iron tray for 12 test tubes 6x⅝ inches **6.00**

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676/2

656. **BATH—Water, Blair for dissolving steel samples, heavy copper,** with rack for 10 test tubes, 6x⅝ inch **5.25**

664. **BATH—Water, electrically heated,** copper cup, nickel plated; with set of concentric copper rings and self enclosed heater. Will boil 1 quart of water in 6 minutes. If the cup should be left to boil dry, the automatic safety device cuts off the current preventing injury to the bath. Diameter, 4 inches, capacity 1 quart, 550 watts required **10.00**

See also Glue Boilers, page 84.

666. **BATH—Water, heavy polished copper** with 8 openings—5 inches diameter—each provided with set of *copper concentric* rings with cover, brass stopcock, Kekule water level regulator. Size 14x28x5 inches, on support **42.00**

668. **Ditto**—Fitted with a coil for steam heating **52.50**

670. **Ditto**—With coil for electric heating; for three heats **115.00**

674. **BATH—Water, copper,** same as No. 666, with 4 openings each 5 inches diameter. Size 14x14x5 inches, on support **28.00**

676. **Ditto**—Fitted with a coil for steam heating **37.00**

676/1. **Ditto**—With coil for electric heating for three heats **87.50**

676/2. **BATH—Water,** for gas, made of heavy polished copper, for dye industry, to hold 4 porcelain beakers, E. & A. 758/1, with concentric rings, water regulator and stopcock; size of bath 14x14 inches, depth 7 inches, on support without beakers **40.00**

676/3. **Ditto**—fitted with a coil for steam heating **50.00**

676/4. **Ditto**—with coil for electric heating; for three heats **100.00**

DYE BEAKERS extra. See No. 758/1.

Constant Temperature Water Baths

677

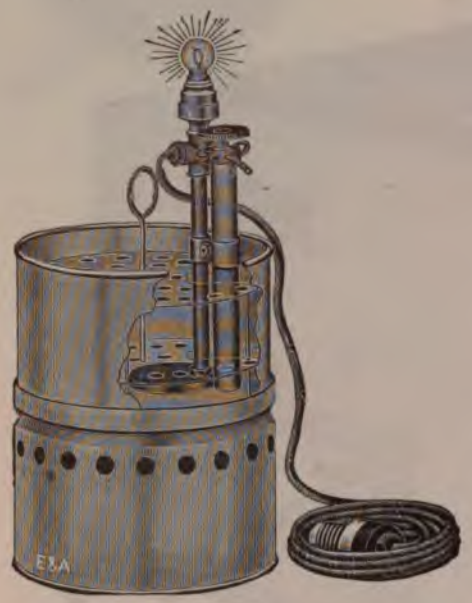
677. **BATH—Water, Freas, Electrically Heated,** with automatic control.

This Bath consists of a heavy copper tank with heavy asbestos outer covering. It has a working space 4 inches deep by 12" x 18". The constant temperature regulator is the standard Freas bimetallic. The temperature-control is to about ½° C. The constant-temperature range without cover is from room temperature up to about 65° C. With cover it is from room temperature up to about the boiling point of water **180.00**

677A. Ditto—without cover **150.00**

DESCRIPTIVE BULLETIN ON REQUEST

For other Automatically Controlled Electrically Heated Water Baths see pages 64-65; also Water Thermostats.



677/2

677/3a

677/3

677/1. **BATH—Water.** Consists of a cylindrical, tinned copper Bath, inside dimensions 6 inches in diameter by 4 inches in depth, together with a Russia iron base, 4 inches high. Furnished with a test tube rack with 28 tubulations, ⅜ inch in diameter; bath only. **10.00**

677/2. **BATH—Water, Electrically Heated.** Consists of a Combination Electric Heater and Pencil Type Thermostat, together with No. 677/1 Water Bath **45.00**

677/3. **BATH—Water, Electrically Heated.** Inside dimensions 9 inches by 9 inches by 5 inches in depth. Made from heavy copper, tinned on the inside and covered on the outside with a thick insulating material to prevent radiation.

The heating Units are placed in metal tubes at the bottom of the Bath and a Pencil Type Thermostat is installed parallel with the Heating Units for regulation of the temperature. A pilot lamp indicates when the current is on or off. A snap switch controls part of the Heating Units for the purpose of changing the temperature of the Bath from 37½°C. to 56°C., if such change should be desired.

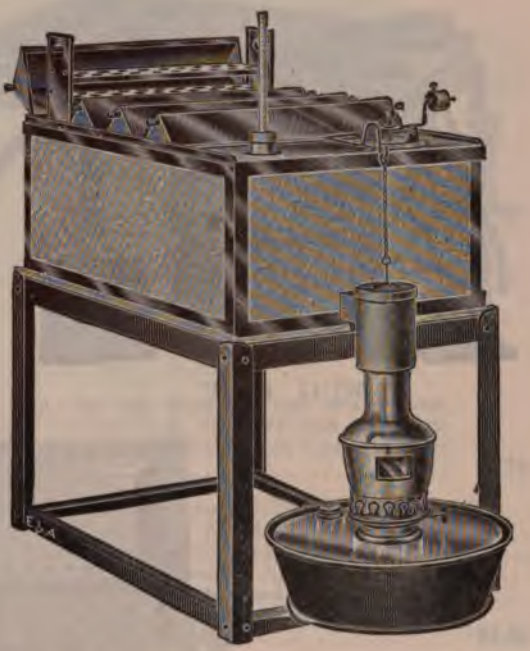
Furnished with two 677/3a Test Tube Racks, each Rack having a capacity of 48 test tubes, 3 inches by ⅜ inch in size **60.00**

677/3a. **BATH—Test Tube Rack.** Capacity 48 test tubes, 3 inches by ⅜ inch in size. Made from nickeled brass with adjustable supports for suspension in Bath, and furnished with two shelves as shown in illustration. Dimensions of rack, 9 inches by 4 inches by 2½ inches high. Height over all, 8 inches **5.50**

677/4. **BATH—Water, Electrically Heated.** Similar in construction to the No. 677/3, but with only one 677/3a Test Tube Rack with a capacity of 48 test tubes, 3 inches by ⅜ inch in size..... **45.00**

677/5

677/5a



677/6

BATH—Water, Constant Temperature Gable Type, Heated Either by Electricity, Oil or Gas.

Made from heavy copper, tinned on the inside; the sides and bottom of the Baths are covered on the outside with a thick insulating material to prevent radiation.

As will be seen from the illustration, the Baths are equipped with hinged gables as a protection from dust and to minimize the evaporation of the water, permitting the condensed water to drip back into the Bath. The Test Tube Racks furnished with the baths are the No. 677/5a.

When electric heat is used, a Pencil Type Thermostat provides for regulation of the temperature. A pilot lamp indicates when the current is ON or OFF. A snap switch controls part of the heating units for the purpose of changing the temperature of the Bath from 37½°C. to 56°C. if such change should be desired.

When oil or gas heat is used, a thermostat of the capsule type is employed. The Baths heated by oil or gas can only be used for 37½° C. The gas attachment is installed exactly the same as the oil lamp, and is interchangeable with same.

Catalog No.	Heat	No. of Racks	Inside Dimensions			Height of Stand	Capacity in Tubes	Price Complete
			Length	Width	Depth			
677/5	Electric	4	13¼ inch	10½ inch	6 inch	4 inch	80	**80.00**
677/6	Oil	4	13¼ "	10½ "	6 "	12 "	80	**75.00**
677/7	Gas	4	13¼ "	10½ "	6 "	12 "	80	**75.00**
677/8	Electric	6	19¾ "	10½ "	6 "	4 "	120	**100.00**
677/9	Oil	6	19¾ "	10½ "	6 "	12 "	120	**90.00**
677/10	Gas	6	19¾ "	10½ "	6 "	12 "	120	**90.00**

677/5a. BATH—Test Tube Rack, made of polished copper, Standard U. S. Army type. Capacity 20 test tubes, 4 inches by ½ inch in size. Each pair of holes is numbered consecutively from 1 to 10 ..... **3.00**

677/11 Fig. IV

677/12 Fig. V

677/13

677/11. **BATH—Water, Electrically Heated, Model according to Dr. Victor J. Chambers and John Wood Scott.** Especially designed for Evaporations, Extractions, Inoculations, Low Temperature Fractional Distillations, etc. Dimensions—15 x 8 x 5 inches... **48.40**

677/12. **BATH—Same as above,** but dimensions 15 x 15 x 5 inches **74.80**

THE BATH is constructed of heavy polished copper, tin lined and equipped with electric heating coil which is placed within the water chamber. A removable cover, provided with tubulation for thermometer, contains two sets (the large bath four sets) of concentric rings, affording openings which range from 1 to 6 inches. A copper tray, also removable, rests inside of the bath supported by brackets. The bath is fitted with a constant water level, also a brass faucet for drawing off the water, and is supported on a sheet iron base six inches high. The equipment includes a special plug switch and six feet of cord.

Pamphlet illustrating various uses of the Fig. I to VI and exact description sent on request.

677/13. **BATH—Water, gas heated,** with double row Bunsen burners, of polished copper, with two removable covers, the one cover with two 5-inch openings and concentric rings, and the other with thirty-six ⅞-inch holes for test tubes. Size 14½ by 6½ by 3 inches deep, 7½ inches high, including base **35.00**

677/14. **Ditto—for electric heating with automatic cut-out** **52.50**

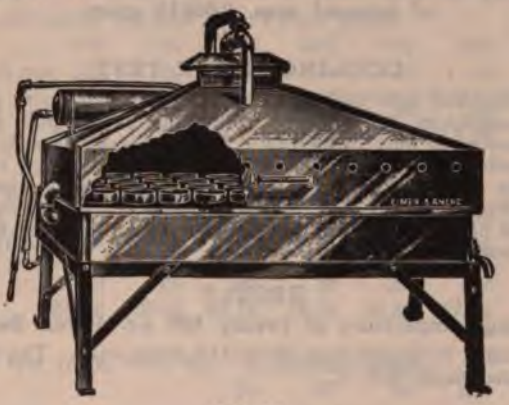
678

680

678. **BATH—Water, Griffin,** heavy copper tin lined, for hot filtration and evaporation. Size 13x7x5 inches, with copper funnel, and one hole 5 in. diameter with concentric copper rings and cover, constant water level, on four detachable iron legs, and extra sheet iron bottom **15.75**

680. **BATH—Water, of heavy copper,** designed by Dr. S. Wiley to quickly obtain steam with minimum gas consumption. Top of bath measures 25x14½ inches, has 14 openings—12–3½ inches and 2–5¾ inches diameter, each fitted with set of concentric copper rings. To the centre of the bottom is riveted a threaded ring, to which the copper cup, (easily replaceable at small cost) underneath, is fitted by means of a threaded collar. Complete, supported on braced stand, and underneath by triangular strips of copper to prevent sagging; with water level regulator **66.00**

681. **Ditto—electrically heated** **100.00**
State voltage when ordering.



684–90

684. **BATH—Steam Evaporator, Alsop,** gas heated; as used in leather laboratories. Made of heavy copper, with condenser at side of top, which condenses the steam that may be used as distilled water. Dimensions inside, 35x25 inches, to accommodate 110-2¾ inch crystallizing dishes **225.00**

686. **Ditto**—Provided with coil for steam heating **232.50**

688. **BATH**—like No. 684, but dimensions inside 25x20 inches to accommodate 60-2¾ inch crystallizing dishes **200.00**

690. **Ditto**—Provided with coil for steam heating **210.00**

695. **BEADS—Glass,** *perforated,* for increasing surfaces in absorbing and drying gases, etc., 3 to 6 mm. diameter .....per pound **3.50**

695/1. **BEADS—Glass,** *solid,* 5 mm. diameter .....per pound **4.00**

(See E. & A. Bulletin No. 201)

Pyrex Laboratory Glassware

Pyrex Glass—a new borosilicate glass possessing an extraordinary low expansion coefficient, 0.0000032, and great resistance to sudden temperature changes.

Chemical stability tests show Pyrex glass to be less soluble in water and acids and about equally soluble in alkalis, compared with the best resistance glass, either American or foreign, heretofore offered. The glass contains no metals of the magnesia-lime-zinc group and no heavy metals.

The low expansion coefficient makes it possible to make Pyrex beakers and flasks with wall slightly thicker than usual—this greatly increases the durability of the vessels without diminishing the resistance to sudden heating and cooling.

Laboratory Tests on Pyrex Beakers

as conducted in the Laboratories of the Corning Glass Works.

STABILITY TEST

The method employed is that standardized by P. H. Walker for comparing the stability of glasses intended for laboratory purposes (*Journal of the American Chemical Society,* Vol. 27, Page 865, 1905). Beakers of 250 c.c. size with 150 c.c. redistilled water were immersed in steam bath forty-eight hours, water being added to keep the volume constant. The method differed from Walker's in that Walker titrates the alkali in the resulting solution, while we evaporate the solution to dryness in a small platinum dish, and weigh the total amount dissolved. The results given include all that were obtained by this method. Deduction of 0.0001 to 0.0003 gram is made for non-volatile purity in the water.

RESULT

Average solubility towards distilled water for each 100 square centimeters of exposed area, 0.00015 gram.

COOLING SHOCK TEST

The beaker three-fourths filled with molten paraffin is heated on wire gauze over burner to about 4° C. below the desired temperature, measured by thermometer with bulb centrally located in the paraffin. The beaker is removed with long tongs (24") from the gauze and the paraffin stirred by means of the thermometer, the bulb being in contact with the bottom. Owing to the fact that the glass is hotter than the paraffin, the temperature will rise five or six degrees. After the maximum is reached, at the first indication of a drop, the beaker is immersed as deeply as possible into water at 15° C. for about 30 seconds. If it does not crack in that time, it is replaced over the flame and heated 10° higher. This is repeated until the beaker cracks.

RESULT

Average breaking temperature of twenty 400 c.c. Pyrex Beakers—253° C.

The beakers tested averaged in weight from 83 to 114 grams each. The minimum breaking temperature was 230° C. and the maximum 280° C.

DROP TEST FOR MECHANICAL SHOCK

Starting at six inches, the beaker is dropped right side up and as nearly level as possible on a two inch pine plank firmly supported, and this is repeated, increasing the height of drop two inches at a time. To avoid excessive bounding after the initial drop and possibility of chipping the upper edge, a piece of cloth is laid around the spot on which the beaker is dropped.

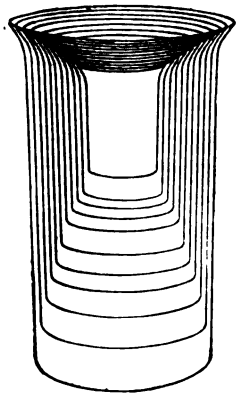
RESULT

Average break drop for twenty 400 c.c. Pyrex Beakers, 30.7 inches.

The beakers tested varied in weight from 80 to 115 grams each.

TERMS.—Prices given herein are strictly net f.o.b. New York, for any quantity less than an original case.

For original case orders a discount of 10% is allowed. This discount represents the cost of repacking less than case lots.



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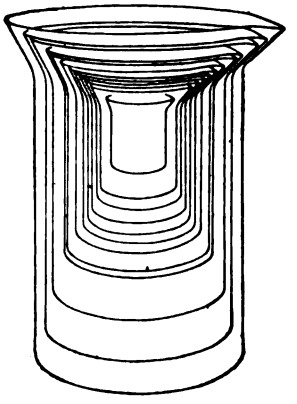

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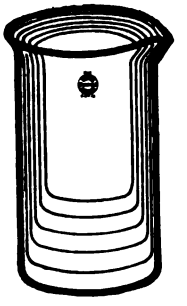

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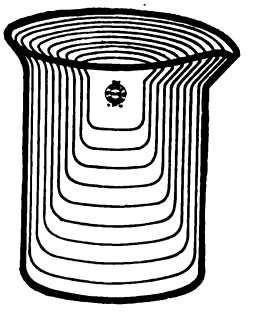


737

Beakers

701. BEAKER—Usual tall form, without lip. High grade resistance glass. Lighter in weight than Pyrex.

Capacity, cc.	30	60	90	120	180	250	300
Each	.12	.12	.13	.14	.16	.17	.18
Capacity, cc.			350	500	700	1000	1200
Each			.21	.25	.30	.40	.50

711. Ditto—Usual tall form, with lip. Resistance glass. Same prices as No. 701.

717. BEAKER—Usual tall form, without lip. Pyrex glass.

Capacity, cc.	100	150	200	300	400	500	600	800	1000
Number in original case	156	120	168	144	60	60	60	48	36
Each	.19	.21	.23	.26	.30	.32	.35	.38	.54
Original case	26.68	22.68	34.78	33.70	16.20	17.28	18.90	16.41	17:49

719. BEAKER—Usual tall form, with lip. Pyrex glass.

Capacity, cc.	100	150	200	300	400	500	600	800	1000
Number in original case	156	120	168	144	60	60	60	48	36
Each	.19	.21	.23	.26	.30	.32	.35	.38	.54
Original case	26.68	22.68	34.78	33.70	16.20	17.28	18.90	16.41	17.49

723. BEAKER—Griffin low form, with lip. Resistance glass.

Capacity, cc.		30	60	90	120	150	180	250
Each		.12	.12	.13	.14	.15	.16	.17
Capacity, cc.	300	350	500	600	700	1000	1400	2000
Each	.18	.21	.25	.26	.30	.40	.55	.82

737. BEAKER—Griffin low form, with lip. Pyrex glass.

Capacity, cc.	30	50	100	150	250	400	600	800	1000
Number in original case	312	216	156	156	168	84	72	48	48
Each	.18	.18	.19	.21	.25	.30	.35	.40	.54
Original case	50.54	34.99	26.68	29.48	37.80	22.68	22.68	17.28	23.32
Capacity, cc.				1300	1500	2000	2500	3000	4000
Number in original case				24	24	12	12	10	10
Each				.65	.73	.98	1.20	1.40	1.80
Original case				14.04	15.76	10.58	12.96	12.60	16.20

739

743

746

750-752

739. BEAKER—Griffin low form, without lip. **Pyrex glass.**

Capacity, cc.	150	250	400	600
No. in original case	156	168	84	72
Each	.21	.25	.30	.35
Original case	29.48	37.80	22.68	22.68

743. BEAKER—Extra tall form, without lip. **Resistance glass.**

Capacity, cc.	90	180	250	350
Each	.13	.16	.18	.23

746. BEAKER—Sugar Heavy glass, with lip.

Capacity, cc.	175	900
Each	.45	.90
Dozen	4.50	9.00

748. BEAKER—Agate ware, without lip.

Capacity, cc.	250	500
Each	.35	.40

750. BEAKER—polished copper, low form, with lip.

Capacity, cc.	125	250	500	1000
Each	.80	1.00	.140	1.90

752. Ditto—nickel plated copper, low form, with lip.

Capacity, cc.	125	250	500	1000
Each	1.00	1.25	1.75	2.35

752/1. BEAKER—Aluminum low shape, with lip.

Capacity, cc.	125	250	500	1000
Each	.70	.90	1.30	1.75

755. BEAKER—Best American Porcelain, Coors, usual form, without lip, glazed inside and outside with exception of outside bottom surface.

Size	1	1a	2	3	3a	4	5
Diameter rim, mm.	62	66	74	87	93	103	114
Height, mm.	93	108	118	143	154	167	198
Capacity, cc.	165	250	340	580	700	970	1500
Each	.90	1.08	1.20	1.44	1.80	2.16	3.00

755/1 758/1 758/2 758/3 759

755/1. **BEAKER—Dye, tall form,** heavy wall, without lip, **Pyrex glass.**

Capacity, cc.	400	600
No. in orig. case	60	60
Each	**.60**	**.70**
Original Case	32.40	37.80

758/1. **BEAKER—Dye Pot, American Porcelain,** glazed inside and outside to the lower heavy rim, without lip, 6½″ high, 5″ diameter, capacity 1250 cc. **2.70**

758/1a. Cover for above ..... **.65**

758/2. **BEAKER—Dye Pot, Coors,** without lip. Glazed inside and outside to heavy supporting rim.

Size Number	2	3
Diameter, mm.	79	120
Diameter below flange, mm.	74	108
Height, mm.	123	188
Capacity, cc.	310	1500
Each	**1.44**	**3.30**

758/3. **BEAKER—Dye Pot, Coors,** without lip, with wooden handle. Glazed inside and outside to heavy supporting rim.

Size Number	2	3
Diameter top, mm.	78	90
Diameter below flange, mm.	76	87
Height, mm.	125	135
Capacity, cc.	400	600
Each	**3.50**	**4.50**

759. **BEAKER—Opaque Fused Silica, "Vitreosil,"** glazed, **tall form, without lip.** For Properties, see page 182.

Capacity, cc.	50	100	150	200	250	400	500	600	800
Each	**1.75**	**2.00**	**2.15**	**2.40**	**3.00**	**3.40**	**3.85**	**4.35**	**5.25**

759/1. **Ditto—low form, with lip.**

Capacity, cc.	50	100	150	200	250	400	500	600	800
Each	**1.90**	**2.15**	**2.35**	**2.60**	**3.15**	**3.60**	**4.00**	**4.50**	**5.40**

BEAKERS, Fused Silica, Transparent, see Quartz.

762

764

BEE-HIVE SHELVES—see Troughs.

BELL GLASSES—see Jars.

BINOCULARS—See Bacteriological Catalog, section 1.

BLAST LAMPS—see Burners.

BLOOD COUNTING APPARATUS—see Bacteriological Catalog, section 1.

762. **BLOWER—Foot, Fletcher,** portable, giving a steady and powerful blast.

No.	9	9a	9b
Diameter of air reservoir, inches	7¼	9	11
Pressure of blast, pounds	1	1½	1¾
Each	**9.50**	**12.50**	**17.25**
Extra Rubber discs, each	**.60**	**.90**	**1.25**
Extra nets, each	**.40**	**.50**	**.60**

764. **BLOWER—Foot, Fletcher, mounted on legs,** the blower being reversed, obviates the risk of injury to the rubber disc.

No.	10	10a	10b
Diameter of air reservoir, inches	7¼	9	11
Pressure of blast, pounds	1	1½	1¾
Each	**10.75**	**14.25**	**19.50**
Extra Rubber discs, each	**.60**	**.90**	**1.25**
Extra nets, each	**.40**	**.50**	**.60**

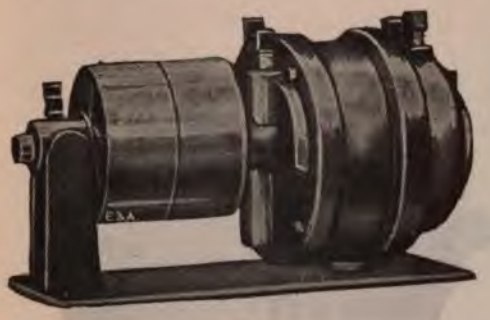
766

768

766. **BLOWER—Hand, Fletcher,** a small copy of the foot blower; when not in use, shuts up flat for the pocket; in case with extra rubber disc **3.40**

768. **BLOWER—Hand Bellows,** diameter, 7 inches **2.25**

BLOWER—Hand, black rubber, double bulbs; constant pressure. See No. 1278.



771
Model A

771CA
Model CA

Gramercy Adjustable Pressure Blowers

771. **BLOWER—Gramercy, Model A,** requires little power to operate, is portable, silent running and highly efficient, will operate several blowpipes at the same time.

Their use eliminates the inconvenient foot blowers, also the great expense of operating a large blower outfit when the use of a single or a few blowpipes is desired.

Gramercy Blowers are equipped with equalizing chamber, which gives an even current of air without the use of a separate tank. They are also provided with an adjusting valve for regulating the pressure.

Details and Prices of Model A

No.	Capacity cubic inches per revolution	Pressure adjustable in pounds	Speed revolution per minute	Pulleys diameter in.	Pulleys face in.	Dimensions length in.	Dimensions width in.	Dimensions height in.	Price
1	20	0 to 4	1000	3½	1⅜	10	6	6	**25.00**
2	30	0 to 6	900	4½	1¾	14	8	8	**35.00**

Model A blowers have combination grooved and flat face pulleys. The grooved pulleys taking ⅜ and ½ inch round belts respectively.

771CA. **BLOWER—Gramercy, Model CA, a combination of the Blower Model A, with an electric motor, mounted on the same base with belt drive.** Operates from either lighting or power circuit.

The motors are fully enclosed, to prevent dust or other particles from getting into the interior.

A detachable plug with 10-foot connecting cord is furnished for ⅙ H.P. and under.

Details and Prices of Model CA

No.	Capacity cubic inches per revolution	Pressure adjustable in pounds	H. P.	Price: 110 Volts D. C.	Price: 220 Volts D. C.	Price: 110 Volts A. C. 60 cycle S. P.	Price: 220 Volts A. C. 60 cycle S. P.
1	20	0 to 4	¼	**57.50**	**60.00**	**67.00**	**70.00**
2	30	0 to 6	⅓	**76.50**	**78.00**	**85.00**	**87.00**

When ordering be sure to specify voltage. If current is A. C. also indicate number of phases and cycles.

772

774

775

772. **BLOWER—Richard,** modified by E. & A., operated by water blast, producing blast and vacuum. Desirable for quick filtering and for operating blast lamps.

With pumps	2	3
Each	**24.00**	**33.00**

774. **BLOWER—Muencke,** operated by water blast, for either blast or suction. Made of brass with zinc water chamber, pump, air outlet and stopcock for regulating flow of water. Without vacuum gauge **18.40**

774/1. **Ditto**—With vacuum gauge **28.00**

BLOWER—Rotary, and Vacuum Pump, Cenco. For producing blast for the operation of blast lamps, etc., or for use with other laboratory devices requiring moderate pressure or vacuum. Mounted on cast iron base, direct connected to Motor, and provided with a special valve by means of which the air pressure can be regulated. A snap switch is mounted on the same base for starting and stopping.

Complete with motor, pressure regulator, switch, cord and plug. Base 9⅝"x5 1/16", speed 1725 R.P.M. Maximum pressure 7 lbs. per sq. in.; cu. ft. of air per min. 0.75. Will operate 2 blast lamps at maximum speed. Maximum vacuum 14" of mercury. Power consumption A.C. 175 watt—D.C. 60 watt.

775. **BLOWER AS ABOVE.**

No.	A	B	C	D
Volts	110 A.C.	220 A.C.	110 D.C.	220 D.C.
Each	**68.00**	**69.50**	**64.50**	**66.50**

775E. **BLOWER AS ABOVE,** but without base or motor, with grooved pulley **18.00**

777. **BLOWER—similar to above,** but larger. Base 13x7¾", Speed 1725 R.P.M. Pressure 10 lbs. per sq. in. Cu. ft. of air per min. 1.1, can operate 4 blast lamps. Vacuum 20" of mercury. Power consumption 175 watts, complete with ⅛ H.P. motor.

No.	A	B	C	D
Volts	110 A.C.	220 A.C.	110 D.C.	220 D.C.
Each	**84.50**	**87.75**	**76.50**	**79.00**

777E. **BLOWER AS NO. 777,** but without base or motor, with grooved pulley **23.00**

778

782

778. **BLOWER—Crowell, Positive Pressure,** adapted to all purposes requiring air under pressure from one to ten pounds to the square inch. The air is delivered in a steady blast, but if a well-regulated delivery is required at a certain pressure, the Air Reservoir is recommended.

Details and Prices of Crowell Blowers.

Size No.	Free Air Capacity		Rev. per Min. Maximum Speed	Horse Power Approx. at Three Pounds Pressure	Pulleys Inches	Pipe Size, Inlet and Outlet	Floor Space Inches	Price of Blower
	Cubic Inches per Rev.	Cubic Feet per Min. at Maximum Speed						
1-A	20	6.9	600	⅛	4 x 1	½ in.	10 x 6¼	**28.00**
2-A	45	13.	500	¼	4 x 1½	¾ in.	12½ x 6½	**36.00**
3-A	125	25.3	350	½	6 x 2½	1 in.	22 x 14	**58.00**
4-A	280	40.5	250	1	9 x 3	1½ in.	28 x 17	**75.00**
5-A	460	53.2	200	1½	10 x 3	2 in.	34 x 20	**110.00**

782. **BLOWER—Crowell Pressure and Vacuum Pump,** for either blast or vacuum alone, or simultaneously. The action is simple, positive and durable. No valves, springs, gear or any parts easily gotten out of order are used or required in the construction. Produces air under pressure up to 35 pounds to the square inch. When used as a Vacuum pump, all sizes will under proper atmospheric conditions exhaust to a vacuum of 29 inches. Air receivers can be supplied, and are intended for connection when the blower is used as an air compressor. No. 1D size is sufficient for most laboratories.

This is the most satisfactory type of blower for supplying blast and vacuum for laboratory purposes, etc.

Size No.	Free Air Capacity		Maximum Speed Rev. per Minute	Approx. H. P.	Pulleys Tight and Loose Inches	Pipe Size Inlet and Outlet	Floor Space Inches	Price of Blower	Price of Air Receiver with Relief Valve
	Cubic Inches per Rev.	Cubic Feet per Min. at Maximum Speed							
1-D	15	4.3	500	1	6 x 2	½ in.	13 x 18	**78.00**	**12.00**
2-D	40	9.2	400	1½	8 x 2	¾ in.	14 x 22	**95.00**	**12.00**
3-D	100	17.	300	2	12 x 4	1 in.	19 x 34	**125.00**	**14.50**
4-D	280	40.5	250	4	14 x 4	1½ in.	23 x 38	**220.00**	**16.50**
5-D	400	46.	200	5	18 x 6	2 in.	26 x 44	**245.00**	**20.00**

782/1

782/2

782/3

782/4

782/5

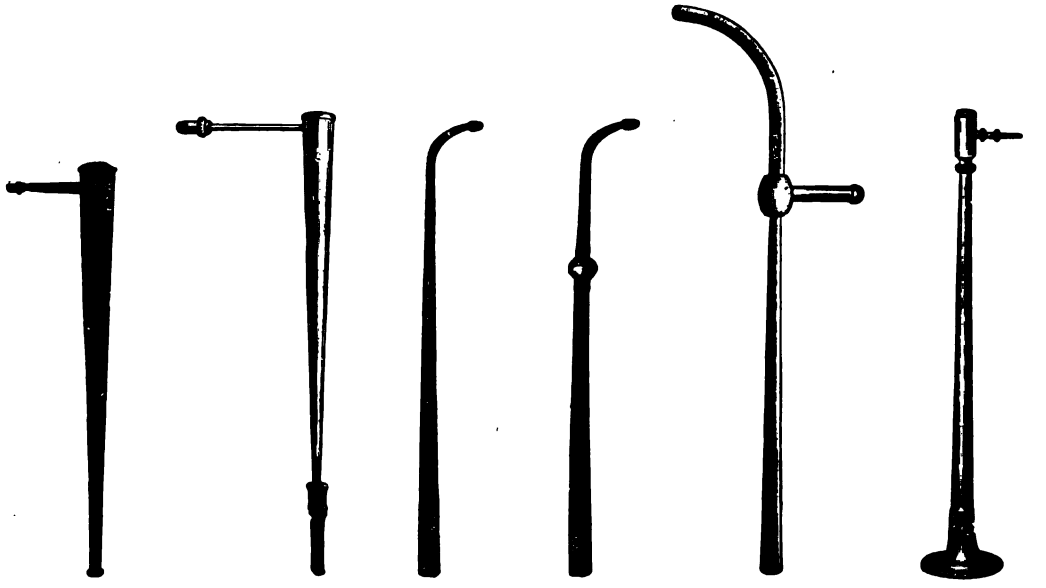
782/1. **BLOWER—Motor-Driven.** All sizes of the No. 782 Type D Compressors or Vacuum Pumps can also be furnished set up on a special bed plate and connected by silent chain drive with motor as illustrated. These outfits are made up to order only and as per specifications as to motor, etc., and prices will be quoted upon request giving details.

782/2. **BLOWER—Motor-Driven** (with Automatic Control), fitted with Self-Starter and Diaphram Control; the Pump will start up and stop automatically at the desired low and high pressure or vacuum point for which the Regulator is set. Prices will be quoted upon request giving details.

782/3. **BLOWER AND VACUUM PUMP NO. O-D, ROTARY**—for use in small Laboratories and for experimental work, designed for intermittent operation and principally for vacuum work, but can also be used for pressure. It is fitted in an oil immersion box, making it practically leak-proof, and will exhaust to a vacuum of 29″ or give pressure up to 25 lbs. to sq. inch. Capacity about 2 cu. ft. of free air per minute. Inlet and outlet tapped for ½″ pipe size, and about ¼ H.P. is required to operate. Speed 600 R.P.M. Can be used with or without the oil box. Weight with oil box 50 lbs. net; without oil box 20 lbs. net. Floor space (in box) 15 x 8″. Price without oil box **55.00**

782/4. **Ditto—with oil Box** **66.00**

782/5. **AIR RECEIVERS**—supplied, as listed on page 75, for the different sizes of the type "D" blowers. The larger sizes can be fitted for connection to any of the smaller size Compressors. The Relief Valve can be set to blow-off at any desired pressure. These Receivers can also be used as vacuum tanks, and pressure and vacuum gauges can be furnished at a small extra cost when required.



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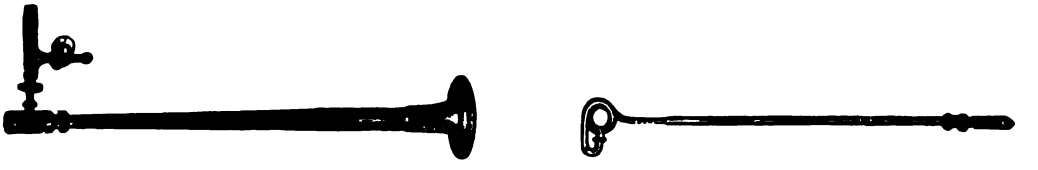


794 796

784. **BLOWPIPE**—japanned, with movable brass tip ..... .20

786. **BLOWPIPE**—with tip that unscrews, and wooden mouthpiece ..... .70

788. **BLOWPIPE—Of brass,** Jeweller's form.

Length, inches	8	10	12
Each	.20	.25	.30
Dozen	2.20	2.60	3.30

789. **Ditto**—with air chamber.

Length, inches	8	10	12
Each	.45	.50	.65
Dozen	4.75	5.50	7.25

789/1. **BLOWPIPE—combined,** bent, length 9 inches 1.20

789a. **HARD RUBBER MOUTHPIECES**—for Nos. 788, 789, 789/1 ..... .40

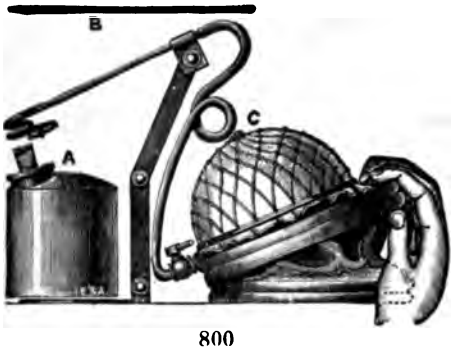
789b. **BLOWPIPE TIP—of Brass** ..... .10

790. **BLOWPIPE—Plattner,** brass, best make, with soldered platinum plate, vulcanite mouthpiece, can be taken apart 3.20

792. **Ditto**—Nickel plated brass, with movable platinum tip 6.50

794 **BLOWPIPE—Plattner,** brass, with gas supply tube, and stopcock 3.30

796. **BLOWPIPE—Fletcher,** hot blast, with vulcanite mouthpiece 1.25



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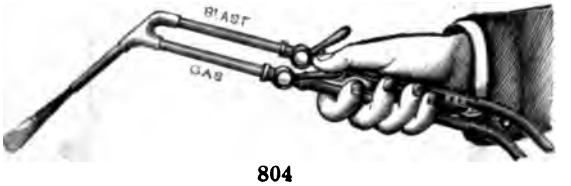

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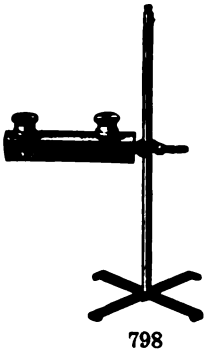

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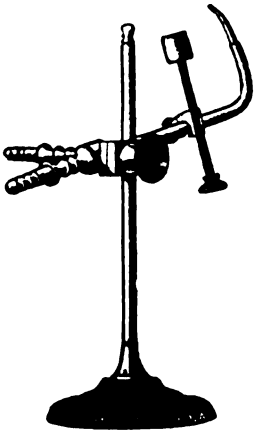


808

798. **BLOWPIPE—Plattner Lamp,** nickel plated, with patent swivel **7.00**

800. **BLOWPIPE—Fletcher special chemical,** with folding stand adjustable to any height or angle, one jet with, and one jet without hot blast coil; complete with blower.. **5.00**

802. **BLOWPIPE—Fletcher patent,** with both cold blast and hot blast jets, nickel plated mouthpiece, in case; without blowpipe lamp **1.50**

803. **BLOWPIPE—Blast, Fletcher,** for brazing. An automatic hand blowpipe, with lever to quickly adjust both air and gas. Requires ⅜ inch bore gas pipe **4.50**

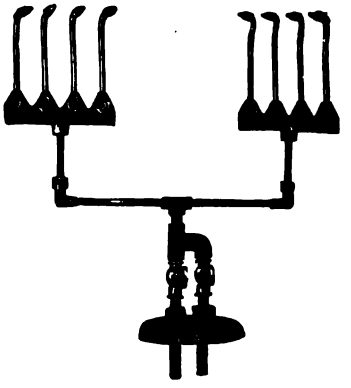
804. **BLOWPIPE—for Brazing,** with two lever stopcocks **4.00**

805. **Ditto—without stopcocks** **2.50**

806. **BLOWPIPE—Lead-burners** .....**per set** **7.00**

808. **BLOWPIPE—Oxy-hydrogen,** with adjustable holder for the lime cylinder, without stopcocks **9.00**

810. **Ditto**—with two stopcocks **10.50**



811

811/1

811. **BLOWPIPE—E. & A. Oxygen Burner, J. T. (Patented),** *type A;* especially adapted for working hard glass, as Pyrex, Quartz, etc. It works on ordinary lighting and oxygen gas **30.00**

811/1. **Ditto—E. & A. Oxygen Burner, J. T. (Patented),** *type B;* single cannon fire **15.00**

811/2. **Ditto—E. & A. Oxygen Burner, J. T. (Patented),** *combined type A. & B.* **42.00**

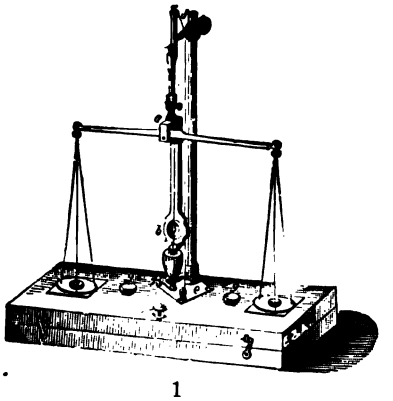
Type A has eight burner tips, four on each side, arranged on two heads, very similar to the ordinary cross fires. This outfit is adapted for all kinds of general use and will give a very intense heat. Each head has a swivel joint so that the burner tips can be swung in any desired direction. There is only one mixer and two hose connections, one for gas and one for oxygen.

Type B is a single Burner and operates the same as Blowpipe A, being designed especially for use with Blowpipe A, for making seals or getting into corners, where a large flame is not required. It has three different tips for different sizes of flame.

INSTRUCTIONS FOR INSTALLING

To set up fires, drill holes through bench to allow tubes to pass through freely for hose connections and hose from gas supply to valve marked G and hose from oxygen tank to hose marked O.

When starting burners, see that both gas and oxygen valves on fires are closed. Next open tank and regulate pressure on small gauge, so that it shows about four pounds; then open gas valve on fires and light gas. After this has been done, open valve on fires marked O very slowly until the proper flame has been obtained, which should be a light blue and should not blow out too strong from the tips. Then see that the flame from each tip strikes to the center of the fires so as to get a sharp flame where they meet. This can be done by slightly bending the tips.



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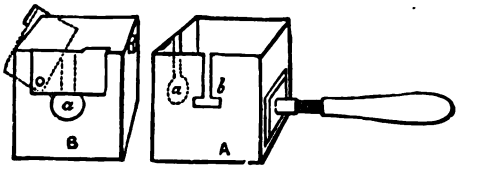

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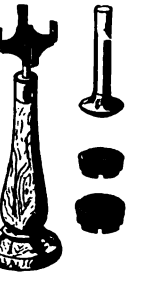


18

Blowpipe Apparatus

853. **ANVIL, of best steel, polished,** see No. 134.

1. **BALANCE,** in polished case... **25.00**
2. **Ditto, with weights** **30.00**

BLOW-PIPE, Black's conical, with brass tip, see No. 784.
BLOW-PIPE, brass, jeweler's form, plain, see No. 788.
BLOW-PIPE, brass, jeweler's form, with bulb, see No. 789.
BLOW-PIPE, Plattner, brass, with platinum plate, see No. 790.
BLOW-PIPE, brass, nickel-plated, with movable platinum tip, see No. 792.
BRUSH, assay button, see No. 1184.
Ditto, mixing, camel hair, see No. 1200.

3. **CARBON BLOCK,** moulded.. **.50**
4. **CARBON BLOCKHOLDER.** **.35**
5. **CHARCOAL BORER, club shape,** large **1.10**
6. **CHARCOAL BORER, four-cornered,** small ..... **.90**
7. **CHARCOAL BORER,** with spatula ..... **.50**
8. **CHARCOAL BORER, chisel, and magnet combined** ..... **.60**
9. **CHARCOAL CAPSULES,** per doz. ..... **.30**
10. **CHARCOAL CRUCIBLES,** per doz. ..... **.30**
11. **CHARCOAL HOLDER** with platinum ring and shield..... **4.00**
12. **CHARCOAL SAW** ..... **.50**
13. **CHARCOAL SQUARES,** per doz. ..... **.80**

853. 14. **CHARCOAL SQUARE COVERS,** per doz. ..... **.60**

CHARCOALS, natural, see No. 1982.
CHARCOALS, artificial, see No. 1984.

15. **CLAY CAPSULES,** per doz.. **.40**
16. **CLAY CRUCIBLES,** per doz. **.40**
17. **CLAY CYLINDER** ..... **.50**

CRUCIBLE, of porcelain, Plattner, see No. 2370.

18. **CUPEL HOLDER,** with two moulds and one stamp..... **1.50**
19. **DISHES of porcelain,** three in set, per set ..... **.50**

DROPPING BOTTLE, for cobalt solution, etc.; 1 ounce, see No. 1012.
DROPPING TUBE, see No. 5224.
FORCEPS, platinum pointed, Plattner style, nickel plated, see No. 3208.
FORCEPS, platinum pointed, steel, nickel-plated, **FRENCH STYLE,** see No. 3206.
FORCEPS, brass, see No. 3188
FORCEPS, steel, nickel-plated, extra long tips, see No. 3204.

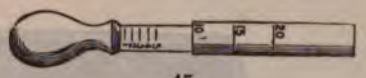
20. **FORM,** for paper cylinders.... **.30**

HAMMER, Plattner style, see No. 3818.
HAMMER, wire handle, Colton style, see No. 3820.
HAMMER, for chipping minerals, see No. 3832.
HARDNESS SCALE, of minerals, 9 specimens, see No. 3840.

21. **HOLDER, for chimney and funnel** **2.00**

27

32-34



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853/22. **HOLDER** for evaporating dish with triangle **2.75**

23. **HOLDER,** for platinum wire..... **.75**

24. **HOLDER**, as above, with six wires **2.00**

25. **IVORY SPOON** ..... **.25**
KNIFE, see No. 4182.
LAMP, for alcohol, glass, see No. 1418/1.
LAMP, for alcohol, brass, 2 oz., see No. 1424.
LAMP, blow-pipe, Plattner, brass nickel-plated, see No. 798.

26. **LAMP,** tin, for tallow ..... **.40**
MAGNET, bar and chisel edge, see No. 853/8.
MAGNET, horseshoe, see No. 4294.
MAGNIFIER, with one lens, see No. 4270.
MAGNIFIER, with two lenses, see No. 4270.
MAGNIFIER, with three lenses, see No. 4270.
MAGNIFIER, with handle, see No. 4276.

27. **MATRASSES,** extra hard glass, with bulb, per dozen ..... **.75**

28. **MATRASSES,** closed tube only, per doz. ..... **.50**

29. **MATRASSES,** glass, flask shape, per doz. ..... **.50**

30. **MATRASS HOLDER** ..... **.45**

31. **MIXING CAPSULE,** brass ..... **.20**

32. **MIXING CAPSULE,** brass, nickel-plated ..... **.40**

33. **MIXING CAPSULE** horn ..... **.20**
MORTAR, agate, with pestle, 2" diam., see No. 4610.
MORTAR, steel Plattner, diamond, small, see No. 4626.
MORTAR, steel, Leed form, see No. 4628.

34. **MOULD,** for charcoal squares and covers, with 2 stamps **5.00**

853/35. **MOULD,** for charcoal capsules.... **.60**

36. **MOULD,** for charcoal crucibles... **.60**

37. **MOULD,** of brass, for clay crucibles **4.00**

38. **MOULD,** of boxwood, for clay crucibles **1.75**

39. **MOULD,** of boxwood, for clay capsules **1.00**
PLATINUM FOIL, per square inch, see platinum.
PLATINUM WIRE, see platinum
PLATINUM SPOON, see platinum.
PLIERS, flat nose, see No. 5422.
PLIERS, Cutting, Plattner, see No. 5430.

40. **SCALE,** of ivory, for measuring silver buttons, Plattner **3.00**
SCISSORS, for lamp, see No. 6104.

41. **SODA PAPERS** .....box **.20**
SPATULA, mixing steel, see No. 6272.
STREAK PLATE, see 5311.

42. **SUPPORT FOR CRUCIBLES, metallic,** for two ..... **.30**

43. **SUPPORT FOR CRUCIBLES, clay** ..... **.40**

44. **TEST LEAD MEASURE** ..... **.50**

45. **TEST LEAD SIEVE** **1.00**

46. **TRAY, FOR COAL** ..... **.75**

47. **TRAY,** for dirt ..... **.50**
TUBES, of hard glass, see No. 7233.
Watchglasses, 2 inch, see No. 7382.

48. **WICK** bundle ..... **.20**
REAGENT BOTTLES, glass stoppered, flat tops, 4 oz., see Nos. 920 and 936.

49. **REAGENT BOTTLES,** cork stoppered, 18 bottles set in wooden block **3.00**

50. **Ditto,** filled with reagents, **price on application.**

854

854. **BLOWPIPING SET**—as used in Columbia University and many other institutions. In velvet lined, polished mahogany case, with handle and lock, complete **75.00**

The set contains:

1 set of 3 Porcelain Dishes.
1 Diamond Steel Mortar.
1 pair Platinum Pointed Forceps.
1 pair heavy Tip Steel Forceps.
1 pair Steel Forceps.
1 Steel Chisel.
1 Charcoal Borer, 4 cornered, with Spatula.
1 Charcoal Borer, club shape.
1 pair Fine Scissors.
1 wire Holder, with
5 Platinum Wires in the handle.
1 Plattner Blow-pipe Lamp, with patent swivel, nickel plated.
1 Charcoal Saw.
1 Holder for the Matrasses.
1 Plattner Nickel-plated Blowpipe.
1 heavy Platinum Tip for same.
1 Steel Hammer with wire handle.
1 set Mould and Stamps.
1 pair of Steel Pliers, Plattner
1 Double Lens
1 Ivory Spoon.
12 Matrasses.
1 Alcohol Lamp, glass, with nickel-plated screw top.
1 Chamois Skin.
6 Glass Tubes.
6 pieces square cut Charcoal.
1 Metal Tray, for coal.
1 Metal Tray, for ashes.
1 Camel-hair Brush.
1 Dropping Pipette.
1 Frame for the Reagent Bottles.
Test Papers.
½ doz. Watch Glasses.
18 Flat top stoppered and labeled Reagent Bottles, containing the following Reagents.
Test Lead.
Tin.
Phosphorus Salt.
Borax Powder.
Borax Glass.
Boracic Acid, fused.
Plattner Flux.
Bismuth Flux.
Boracic Acid.
Carbonate Soda.
Salt.
Soda.
Soda Nitrate.
Charcoal.
Boneash, sieved.
Boneash, washed.
Copper Oxide.
Bisulfate Potash.

855. **BLOWPIPING SET—E. & A. Prospector's Outfit,** in fine polished wood case with metal handles, complete **30.00**

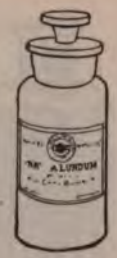
The set contains:

1 Jeweler's Blow-pipe.
1 Alcohol Lamp.
1 Magnifying Lens; double.
1 Porcelain Mortar, 2¼ in.
2 Porcelain Crucibles and Covers.
1 Funnel, glass, 2 in.
1 dozen Test Tubes, 3 in.
1 dozen Glass Tubes and Rods, assorted.
3 small Beakers, 0 to 000.
1 pair Slag Pincets.
1 Spatula, 3 in.
1 piece Sheet Zinc.
1 piece Copper Wire.
1 piece Tin Foil.
1 Chamois Skin.
1 H. S. Magnet, 3 in.
1 piece Iron Wire. Platinum wire and holder.
3 Carbon Sticks.
1 package Filter Paper.
4 drams Ferrous Sulfate.
4 drams Borax Glass.
4 drams Oxalic Acid.
4 drams Sodium Carbonate, dry.
1 oz. Sulfuric Acid, c. p. conc.
1 oz. Hydrochloric Acid, c. p. conc.
2 ozs. Nitric Acid, c. p. conc.
2 ozs. Ammonia, strong, c. p.
2 ozs. Mercury.
4 ozs. Gran. Lead.
4 drams Carbonate Potash.

856

860

862



864

856. **BOAT—Combustion, best American Porcelain, Coors make,** glazed throughout with exception of outside bottom surface.

No.	0	1	2	3	4	5	6	7	8
Length, mm.	58	60	60	62	76	76	88	97	100
Width, mm.	10	7	10	8	10	11	12	18	20
Height, mm.	8	8	8	8	9	9	8	13	13
Each	**.26**	**.26**	**.26**	**.27**	**.29**	**.29**	**.30**	**.32**	**.34**

856/1. **BOAT—Combustion, American Porcelain, good grade.**

Length, mm.	60	75	75	100	115
Width, mm.	10	11	15	18	13
Height, mm.	8	9	9	10	10
Each	**.22**	**.24**	**.24**	**.28**	**.35**

858. **BOAT—Combustion, Opaque fused Silica "Vitreosil,"** glazed throughout without handle.

Length, mm.	75	75	100
Width, mm.	12	15	15
Each	**1.00**	**1.15**	**1.50**

859. **BOAT—Combustion, Opaque fused Silica, American make,** glazed throughout, without handle.

Length, mm.	75	75	100
Width, mm.	12	15	15
Each	**.94**	**1.12**	**1.44**

860. **BOAT—Combustion, C. M. Johnson, of vitrified clay,** size 120 x 15 mm.....**doz.** **1.92**

862. **BOAT—Combustion, Alundum.** Especially adapted and largely used for the determination of carbon in iron and steel. Alundum does not react with the iron oxide of the sample, and the boats can be used repeatedly.

Length, mm.	90	95	125
Width, mm.	12	15	20
Each	**.35**	**.40**	**.46**

BOAT—Combustion, Transparent Silica ware. See quartz.

BOAT—Combustion, nickel. See No. 2207.

BOAT—Combustion, platinum. See No. 5320.

864. **"RR" ALUNDUM (blue Label)**—has been specially treated to remove carbonaceous and surface alkali. The purity of this grade is assured by quantitative analysis of a sample from each lot made. A very satisfactory blank determination for carbon is maintained. This material is supplied in 46, 60 and 90 mesh grain.

1 lb. in glass stoppered bottles	**1.75**
2 lb. " " " "	**2.60**
3 lb. " " " "	**4.90**

866

866. **BOILER—Agateware,** with water bath.

Capacity, cc.	1 qt.	4 pts.	6 pts.
Each	**1.40**	**2.10**	**2.45**

866/1. **BOILER—Aluminum Ware,** with water bath.

Capacity, cc.	1 qt.	4 pts.	6 pts.
Each	**2.50**	**3.25**	**4.00**

867

867/1

867. BOILER—(Jacketless Glue Pot) Electric, single-heat.

Capacity, Quarts	1	2	4	8
Watts	70	90	140	250
Each	**23.25**	**27.00**	**35.00**	**50.00**

The jacketless glue pot is made of a single aluminum casting. Aluminum is used not only because of its remarkable qualities as a heat distributor, but also because the unctuous surface of the metal prevents the glue sticking to the sides of the pot. Designed to operate at a maximum temperature of 80° Centigrade.

867/1. BOILER—(Water jacketed Glue Pot) Electric, three-heat.

Capacity, Quarts	1	2	4
Watts	110–220–440	170–340–680	275–550–1100
Each	**30.00**	**33.00**	**50.00**

The electric water jacketed glue pot employs the usual water jacket common to other types for heating the glue, and permits the use of a "high starting heat" to cause a rapid melting of the glue, as is often required for sudden, intermittent service.

This pot is especially applicable to circuits where extreme voltage fluctuations are liable to occur, for the water jacket automatically compensates, by its increased evaporation, for any excess current due to voltage variation as well as to the "high heat."

The glue pot is made of spun aluminum and the water jacket of cast iron.

867/2

867/2. BOILER—Glue pot, Regular porcelain lined cup, without heating arrangement.

Capacity, pints	1	2	3
Each	**1.50**	**2.00**	**2.25**

For other Boilers, see Casseroles, etc.

BOLTING CLOTH SEE NO. 6170.

900

904

910

912

900. **BOTTLE—Narrow mouth, Round. Green glass,** for corks.

Capacity, ozs.	½	1	2	3	4	6	8	16
Dozen	.60	.63	.70	.86	.97	1.10	1.25	1.80
Gross	5.85	6.30	7.00	8.60	9.70	11.00	12.60	18.20
Capacity		2 pts.	3 pts.	5 pts.	1 gal.	2 gals.	3 gals.	5 gals.
Dozen		2.75	3.25	5.90	7.15	18.00	22.50	30.60
Gross		27.60	32.60	58.75	71.40	180.00	225.00	306.00

902. **BOTTLE—Narrow mouth, Round. Flint glass,** for corks.

Capacity, ozs.	½	1	2	3	4	6	8	12	16	32	64
Dozen	.62	.66	.73	.90	1.02	1.20	1.32	1.70	1.92	2.90	4.50
Gross	6.20	6.60	7.30	9.00	10.20	11.60	13.20	17.00	19.20	29.00	45.40

903. **BOTTLE—Narrow mouth, Round. Amber glass,** for corks.

Capacity, ozs.	8	16	32	64
Dozen	1.25	1.80	2.75	4.30
Gross	12.60	18.20	27.60	43.20

904. **BOTTLE—Narrow mouth, Square. Flint glass,** for corks.

Capacity, ozs.	⅛	¼	½	1	2	3	4
Dozen	.62	.62	.62	.66	.73	.90	1.02
Gross	6.20	6.20	6.20	6.60	7.30	9.00	10.20
Capacity, ozs.			6	8	12	16	32
Dozen			1.20	1.32	1.70	1.92	2.90
Gross			11.60	13.20	17.00	19.20	29.00

906. **BOTTLE—Narrow mouth, Square. Amber glass,** for corks.

Capacity, ozs.	½	1	2	3	4	6	8	12	16
Dozen	.60	.63	.70	.86	.97	1.10	1.26	1.62	1.85
Gross	5.85	6.30	7.00	8.60	9.70	11.00	12.60	16.20	18.25

906/1. **Ditto—blue glass.**

Dozen	.69	.72	.80	1.00	1.10	1.26	1.44	1.86	2.12
Gross	6.70	7.25	8.00	10.00	11.00	12.65	14.50	18.60	21.00

908. **BOTTLE—Narrow Mouth. Philadelphia Ovals** (cut same as No. 900 but oval shape).

Capacity, ozs.	½	1	2	3	4	6	8	12	16
Dozen	.62	.66	.73	.90	1.02	1.20	1.32	1.70	1.90
Gross	6.20	6.60	7.30	9.00	10.20	11.60	13.20	17.00	19.00

910. **BOTTLE—Wide mouth, Round. Flint glass,** for corks.

Capacity, ozs.	½	1	2	3	4	6	8	12	16	24	32	64
Dozen	.65	.70	.75	.92	1.06	1.20	1.40	1.80	2.00	2.60	3.00	6.50
Gross	6.40	6.85	7.60	9.20	10.60	12.10	13.70	18.00	20.00	26.00	30.00	60.00

912. **BOTTLE—Wide mouth, Square. Flint glass,** for corks.

Capacity, ozs.	½	1	2	3	4	6	8	12	16	32
Dozen	.60	.64	.72	.90	1.02	1.15	1.30	1.70	1.92	3.10
Gross	6.10	6.40	7.20	8.80	10.20	11.50	13.00	17.00	19.20	31.00

916 917 918 920 922 924

914. **BOTTLE—Wide Mouth. Green glass,** for corks.

	Pints					Gals.		
Capacity	1½	2	3	5	6	1	2	5
Each	.23	.28	.35	.60	.65	.75	1.70	2.95
Dozen	2.20	2.85	3.30	5.95	6.25	7.50	17.00	29.00

916. **BOTTLE—Extra Wide Mouth. Flint glass,** for corks.

Capacity, ozs.	½	1	2	3	4	8
Dozen	.70	.78	.83	1.02	1.20	1.50
Gross	7.00	7.80	8.40	10.20	12.00	15.00

917. **BOTTLE—Acid, glass stoppered, green glass.**

	ozs.			pts.	gals.	
Capacity	8	16	32	5	1	2
Dozen	2.60	3.50	4.80	7.20	10.80	21.00

918. **BOTTLE—Narrow Mouth, glass stoppered, tincture,** well ground high stopper.

Capacity, cc.	15	30	60	125	200
Dozen	1.45	1.50	1.60	2.00	2.40
Capacity, cc.		250	360	500	1000
Dozen		2.60	3.50	3.80	5.40
Capacity, liters	2	4	8	12	20
Each	.75	2.00	4.00	8.00	13.00

920. **BOTTLE—Narrow Mouth, glass stoppered, tincture,** well ground flat stopper.

Capacity, cc.	15	30	60	125	200
Dozen	1.75	1.80	2.00	2.40	2.90
Capacity, cc.	250	360	500	1000	2000
Dozen	3.00	4.20	4.50	6.50	10.80

922. **BOTTLE—Narrow Mouth, E. & A.,** with strong polished stopper with projecting rim and square top.

Capacity, cc.	125	250	500	1000
Dozen	2.40	3.00	4.20	6.00

923. **BOTTLE—Same as above, but amber glass.**

Dozen 2.80 3.60 4.80 7.20

924. **BOTTLE—Narrow Mouth, flint glass,** mushroom stopper, superior finish.

Capacity, cc.	30	60	125	200	250	500
Dozen	2.00	2.40	2.60	3.80	4.20	6.00
Capacity, liters		1	2	4	8	12
Dozen		7.20	10.80	18.00	37.80	60.00

925. **BOTTLE—similar to 924** but less expensive.

Capacity, cc.	30	60	125	200	250	500
Dozen	1.35	1.75	2.10	2.50	2.70	4.00
Capacity, liters				1	2	4
Dozen				5.50	9.00	16.00

926 932 936 942 944 946

926. **BOTTLE—Narrow Mouth, Square, flint glass,** mushroom stopper.

Capacity, cc.	30	60	125	250	500	1000
Dozen	2.20	2.40	2.70	3.75	5.00	6.75

928. **BOTTLE—Narrow Mouth, glass stoppered, amber glass.**

Capacity, cc.	125	250	500	1000	2000
Dozen	2.30	3.00	4.40	6.20	10.50

932. **BOTTLE—Narrow Mouth, Square low shape,** glass stopper.

Capacity, cc.	15	30	60	125	250
Dozen	2.00	2.10	2.30	2.60	3.70

936. **BOTTLE—Wide mouth, flat glass stopper,** well ground.

Capacity, cc.	30	60	125	200	250	360	500
Dozen	1.80	2.00	2.20	2.80	3.00	4.00	4.20
Capacity, liters				1	2	4	8
Each				.50	1.50	3.00	4.40

937. **BOTTLE—Wide Mouth, E. & A.,** with strong polished stopper, with projecting rim and square top.

Capacity, cc.	125	250
Dozen	3.00	3.75

942. **BOTTLE—Wide Mouth, flint glass,** mushroom stopper, superior finish.

Capacity, cc.	30	60	125	200	250	500
Dozen	2.40	2.60	3.00	4.25	5.40	6.60
Capacity, liters			1	2	4	8
Each			.75	1.10	2.00	3.50

943. **BOTTLE—similar to 942, but less expensive.**

Capacity, cc.	30	60	125	250	500
Dozen	1.50	1.70	2.20	2.75	4.00
Capacity, liters				1	2
Each				.50	.90

944. **BOTTLE—Wide Mouth, Square, flint glass,** mushroom stopper.

Capacity, cc.	30	60	125	250
Dozen	2.40	2.60	3.00	4.00

946. **BOTTLE—Wide Mouth, hollow ground glass stopper,** enabling a spoon to be kept in the bottle.

Capacity, cc.	125
Dozen	.90

948

948. **BOTTLE—Caps, glass,** to cover stoppers.

For bottle; capacity, cc.	125	250	500	1000
Each	.14	.16	.18	.20
Dozen	1.40	1.60	1.80	2.00

"GRAMERCY" REAGENT BOTTLES

Manufactured by Eimer & Amend

The kind you can write on

"Gramercy" labels carry large, distinct black letters on a white background. Label is composed of acid resisting enamels burnt into the glass and will not chip off nor become scratched.

The black will not run into the white when brought in contact with acids. White area is of a non-glossy finish, having a slightly roughened surface which takes pencil writing and also permits erasure of notes so made. For thorough cleansing wipe with dilute nitric acid. *Circular more fully describing the above with especially prepared time saving order blanks mailed on request.*

SIZE OF LABELS

for 1 oz. bottles 2 x 1¼ in. for 4 oz. bottles 3 x 1¾ in.
for 8 oz. bottles 3 x 1¾ in. for 16 oz. bottles 4 x 2¼ in.
for 32 oz. bottles 4 x 2¼ in.

If bottles with stock names listed under another size are desired, same can be furnished, but the size of the label will remain unchanged. For example, Acid Acetic is listed only in 4 and 8 oz. sizes. This name can be placed on a 16 oz. or 32 oz. bottle; the dimensions of the label, however, will still be 3 x 1¾ in.

		4 oz.	8 oz.	16 oz.	32 oz.
951.	Narrow mouth, each	.65	.75	1.00	1.20
953.	Wide mouth, each	.70	.80	1.05	1.25

955. Set of 40 (as listed on page 90), consisting of 28 narrow mouth 4 oz., 5 narrow mouth 8 oz., 6 wide mouth 4 oz., and 1 narrow mouth 1 oz. ..... .set 25.00

951

953

No. 951. **General List of Narrow Mouth Bottles**

	4 oz.	8 oz.
Acid Acetic $HC_2H_3O_2$	G3	G131
Acid Citric $C_6H_8O_7$	G513	G532
Acid Hydrochloric HCl	G2	G533
Acid Hydrochloric (Conc) HCl	G419	G105
Acid Hydrochloric (Dil) HCl	G429	G106
Acid Nitric HNO_3	G5	G534
Acid Nitric (Conc) HNO_3	G422	G103
Acid Nitric (Dil) HNO_3	G430	G104
Acid Oxalic $H_2C_2O_4$	G93	G535
Acid Picric $C_6H_2OH(NO_2)_3$	G94	G536
Acid Phosphotungstic (P_2O_5-$20WO_3$-$11H_2O$)	G514	G537
Acid Sulphuric H_2SO_4	G4	G538
Acid Sulphuric (Conc) H_2SO_4	G420	G101
Acid Sulphuric (Dil) H_2SO_4	G431	G102
Acid Sulphanilic $C_6H_4(NH_2)(SO_3H)$	G516	G539
Acid Tartaric $H_2C_4H_4O_6$	G517	G540
Ammon. Carbonate $(NH_4)_2CO_3$	G18	G110
Ammon. Chloride NH_4Cl	G17	G109
Ammon. Hydroxide NH_4OH	G15	G108
Ammon. Hydroxide (Conc) NH_4OH	G680	G681
Ammon. Hydroxide (Dil) NH_4OH	G682	G683
Ammon. Molybdate $(NH_4)_2MoO_4$	G82	G155
Ammon. Oxalate $(NH_4)_2C_2O_4$	G19	G130
Ammon. Phosphate $(NH_4)_2HPO_4$	G518	G158
Ammon. Sod. Phos. $NaNH_4HPO_4$	G519	G542
Ammon. Sulphydrate NH_4HS	G97	G543
Ammon. Sulphocyanate NH_4CNS	G31	G544
Alcohol Absolute C_2H_5OH	G520	G545
Alcohol 95 % C_2H_5OH	G521	G546
Blank || 1 oz.—G375	G38	G116
Barium Carbonate $BaCO_3$	G33	G548
Barium Chloride $BaCl_2$	G20	G114
Barium Hydroxide $Ba(OH)_2$	G32	G549
Barium Nitrate $Ba(NO_3)_2$	G401	G550
Borax $Na_2B_4O_7$	G684	G685
Bromine Water	G406	G551

	4 oz.	8 oz.
Calcium Carbonate $CaCO_3$	G686	G687
Calcium Chloride $CaCl_2$	G21	G552
Calcium Hydroxide $Ca(OH)_2$	G23	G151
Calcium Hypochlorite $Ca(ClO)_2$	G523	G553
Calcium Sulphate $CaSO_4$	G22	G554
Carbon Disulphide CS_2	G83	G555
Chloroform $CHCl_3$	G407	G556
Cupric Sulphate $CuSO_4$	G36	G557
Ether $(C_2H_5)_2O$	G35	G159
Fehling's Solution	G58	G559
Ferric Ammonium Sulphate $FeNH_4(SO_4)_2$	G524	G560
Ferric Chloride $FeCl_3$	G29	G561
Ferrous Sulphate $FeSO_4$	G28	G154
Griess' Reagent	G525	G562
Hydrogen Sulphide H_2S	G1	G107
Indigo Solution	G87	G587
Lead Acetate $Pb(C_2H_3O_2)_2$	G27	G152
Litmus	G410	G563
Magnesia Mixture	G688	G689
Magnesium Sulphate $MgSO_4$	G24	G565
Mercuric Chloride $HgCl_2$	G25	G153
Mercurous Nitrate $Hg_2(NO_3)_2$	G86	G566
Methyl Orange	G411	G567
Methyl Alcohol CH_3OH	G415	G568
Nessler's Solution	G88	G569
Potassium Carbonate K_2CO_3	G8	G570
Potassium Chromate K_2CrO_4	G96	G160
Potassium Cyanide KCN	G303	G572
Potassium Chlorate $KClO_3$	G527	G573
Potassium Dichromate $K_2Cr_2O_7$	G13	G574
Potassium Ferricyanide $K_3Fe(CN)_6$	G11	G575
Potassium Ferrocyanide $K_4Fe(CN)_6$	G6	G576
Potassium Hydroxide KOH	G12	G150
Potassium Iodide KI	G10	G577
Potassium Nitrate KNO_3	G302	G578
Potassium Sulphate K_2SO_4	G9	G579

No. 951. **Continued.**

	4 oz.	8 oz.
Potassium Sulphocyanate KCNS	G7	G580
Phenolphthalein	G412	G581
Platinic Chloride $PtCl_4$. || 1 oz.—G531	.....	.....
Sodium Acetate $NaC_2H_3O_2$	G60	G582
Sodium Carbonate Na_2Co_3	G59	G112
Sodium Hydroxide NaOH	G61	G111
Sodium Tungstate Na_2WO_4	G528	G583

	4 oz.	8 oz.
Sodium Nitroprusside $Na_2Fe(CN)_5$. (NO)	G529	G584
Sodium Nitrate $NaNO_3$	G530	G585
Sodium Phosphate Na_2HPO_4	G14	G129
Stannous Chloride $SnCl_2$	G81	G156
Silver Nitrate $AgNO_3$ (amber)	G26	G145
Sodium Cobaltic Nitrite	G416	G586
Test Paper	G690	G691
Uranium Acetate $UO_2(C_2H_3O_2)_2$	G56	G588

	16 oz.	32 oz.
Acid Hydrochloric HCl	G217	G591
Acid Hydrochloric (Conc) HCl	G222	G505
Acid Hydrochloric (Dil) HCl	G231	G506
Acid Nitric HNO_3	G216	G592
Acid Nitric (Conc) HNO_3	G503	G671
Acid Nitric (Dil) HNO_3	G504	G672
Acid Sulphuric H_2SO_4	G215	G674
Acid Sulphuric (Conc) H_2SO_4	G220	G501
Acid Sulphuric (Dil) H_2SO_4	G673	G502
Ammon. Hydroxide NH_4OH	G204	G512
Ammon. Hydroxide (Conc) NH_4OH	G690	G691
Ammon. Hydroxide (Dil) NH_4OH	G692	G693
Blank || 1 oz.—G375	G211	G511
Solution Acid Arsenious N/	G589	G614
Solution Acid Nitric N/	G590	G615
Solution Acid Oxalic N/	G675	G616
Solution Acid Hydrochloric N/	G676	G617
Solution Acid Sulphuric N/	G593	G618
Solution Ammon. Hydroxide N/	G594	G619
Solution Barium Chloride N/	G595	G620

	16 oz.	32 oz.
Solution Barium Hydroxide N/	G596	G621
Benedict's Solution	G639	G640
Solution Iodine N/	G597	G622
Solution Potass. Bichrom. N/	G598	G623
Solution Pot. Hydroxide N/	G599	G624
Solution Potass. Permanganate N/	G600	G625
Solution Potass. Sulphocyanate N/	G601	G626
Solution Sodium Carbonate N/	G602	G627
Solution Sodium Chloride N/	G603	G628
Solution Sodium Hydroxide N/	G604	G629
Solution Sodium Thiosulphate N/	G605	G630
Solution Silver Nitrate N/	G606	G631
Solution N/	G607	G632
Standard Soap Solution	G608	G633
Standard Iodine Solution	G609	G634
Standard Solution Uranium Acetate	G610	G635
Standard Solution Uranium Nitrate	G611	G636
Starch Solution	G612	G637
Volumetric Solution Bromine N/	G613	G638
Distilled Water H_2O	G694	G695

No. 953. **General List of Wide Mouth Bottles.**

	4 oz.	8 oz.
Acid Picric $C_6H_2OH(NO_2)_3$	G641	G656
Ammon. Carbonate $(NH_4)_2CO_3$	G642	G657
Ammon. Chloride NH_4Cl	G643	G658
Blank	G677	G678
Borax $Na_2B_4O_7$	G304	G547
Calcium Chloride $CaCl_2$	G645	G660
Cupric Sulphate $CuSO_4$	G646	G661
Ferrous Sulphate $FeSO_4$	G647	G662

	4 oz.	8 oz.
Magnesia Mixture	G90	G564
Potassium Cyanide KCN	G649	G664
Potassium Chlorate $KClO_3$	G650	G665
Potassium Iodide KI	G651	G666
Potassium Nitrate KNO_3	G652	G667
Sodium Carbonate Na_2CO_3	G653	G668
Sodium Nitrate $NaNO_3$	G654	G669
Test Paper	G312	G679

No. 955. Set of 40.

Acid Sulphuric (Dil) H_2SO_4
Acid Hydrochloric HCl
Acid Nitric HNO_3
Ammon. Hydroxide $(NH_4)OH$
Blank
Acid Sulphuric (Conc) H_2SO_4
Ammon. Chloride $(NH_4)Cl$
Ammon. Oxalate $(NH_4)_2C_2O_4$
Ammon. Sulphocyanate $(NH_4)CNS$
Ammon. Molybdate $(NH_4)_2MoO_4$
Ammon. Carbonate $(NH_4)_2CO_3$
Acid Acetic $HC_2H_3O_2$
Alcohol 95 % C_2H_5OH
Silver Nitrate $AgNO_3$ (amber)
Barium Chloride $BaCl_2$
Calcium Hydroxide $Ca(OH)_2$
Cupric Sulphate $CuSO_4$
Ferric Chloride $FeCl_3$
Hydrogen Sulphide H_2S (amber)
Ammon. Sulphide $(NH_4)_2S$ (amber)
Magnesium Sulphate $MgSO_4$
Mercuric Chloride $HgCl_2$
Mercurous Nitrate $Hg_2(NO_3)_2$
Platinic Chloride $PtCl_4$ (1 oz.)
Lead Acetate $Pb(C_2H_3O_2)_2$
Potassium Dichromate $K_2Cr_2O_7$
Potassium Ferrocyanide $K_4Fe(CN)_6$
Potassium Iodide KI
Sodium Carbonate Na_2CO_3
Sodium Acetate $NaC_2H_3O_2$
Sodium Phosphate Na_2HPO_4
Uranium Acetate $(UO_2)(C_2H_3O_2)_2$
Ether $(C_2H_5)_2O$
1 Blank
Sodium Carbonate Na_2CO_3
Borax $Na_2B_4O_7$
Ferrous Sulphate $FeSO_4$
Potassium Cyanide KCN
Ammon. Sod. Phosphate $NaNH_4HPO_4$
Test Paper

Eimer and Amend Reagent Bottles

958

These bottles are of good American glass, with strong polished stopper, with projecting rim and square top. The rim of this improved stopper protects the mouth of the bottle from dust and **obviates the necessity of a bottle cap.**

The shape of the stopper makes it very strong, and permits of its being placed on the table, either inverted or sideways, without the ground part touching.

Bottles for Potassium Hydroxide, and other chemicals from which an ordinary stopper is often removed with difficulty, or not at all, are provided with a loosely fitting stopper, the under part of the flange of which, as well as the mouth of the bottle, is ground true.

966

Bottles, narrow mouth, capacity 125, 250, 500, 1000 cc., and wide mouth 125 cc. capacity are carried in stock, with the labels mentioned under the respective sizes below.

958. **BOTTLES—E. & A. Reagent, narrow mouth,** capacity 125 cc., height 135 mm., with label ..... **each** .55

No.		No.	
E 1.	Hydrogen Sulfide (Amber) H_2S	E 23.	Calcium Hydroxide $Ca(OH)_2$
E419.	Hydrochloric Acid, Con. HCl	E 24.	Magnesium Sulfate $MgSO_4$
E429.	Hydrochloric Acid, Dil. HCl	E 25.	Mercuric Chloride $HgCl_2$
E 3.	Acetic Acid $HC_2H_3O_2$	E 26.	Silver Nitrate $AgNO_3$ (Amber)
E420.	Sulfuric Acid, Con. H_2SO_4	E 27.	Lead Acetate $Pb(C_2H_3O_2)_2$
E431.	Sulfuric Acid, Dil. H_2SO_4	E 28.	Ferrous Sulfate $FeSO_4$
E422.	Nitric Acid, Con. HNO_3	E 29.	Ferric Chloride $FeCl_3$
E430.	Nitric Acid, Dil. HNO_3	E 30.	Alcohol C_2H_5OH
E 6.	Potassium Ferrocyanide $K_4Fe(CN)_6$	E 31.	Ammonium Sulfocyanate NH_4CNS
E 7.	Potassium Sulfocyanate KCNS	E 32.	Barium Hydroxide $Ba(OH)_2$
E 8.	Potassium Carbonate K_2CO_3	E 35.	Ether $(C_2H_5)_2O$
E 9.	Potassium Sulfate K_2SO_4	E 36.	Cupric Sulfate $CuSO_4$
E 10.	Potassium Iodide KI	E 37.	Platinum Chloride $PtCl_4$
E 11.	Potassium Ferricyanide $K_3Fe(CN)_6$	E 56.	Uranium Acetate $UO_2(C_2H_3O_2)_2$
E 12.	Potassium Hydroxide KOH	E 58.	Fehling's Solution
E 13.	Potassium Dichromate $K_2Cr_2O_7$	E 59.	Sodium Carbonate Na_2CO_3
E 14.	Sodium Phosphate Na_2HPO_4	E 60.	Sodium Acetate $NaC_2H_3O_2$
E 15.	Ammonium Hydroxide NH_4OH	E 61.	Sodium Hydroxide NaOH
E 16.	Ammonium Sulfide $(NH_4)_2S$ (Amber)	E 81.	Stannous Chloride $SnCl_2$
E 17.	Ammonium Chloride NH_4Cl	E 82.	Ammonium Molybdate $(NH_4)_2MoO_4$
E 18.	Ammonium Carbonate $(NH_4)_2CO_3$	E 83.	Carbon Disulfide CS_2
E 19.	Ammonium Oxalate $(NH_4)_2C_2O_4$	E 86.	Mercurous Nitrate $Hg_2(NO_3)_2$
E 20.	Barium Chloride $BaCl_2$	E 96.	Potassium Chromate K_2CrO_4
E 21.	Calcium Chloride $CaCl_2$	E407.	Chloroform
E 22.	Calcium Sulfate $CaSO_4$	E428.	Hydrogen Peroxide

960. **BOTTLES—E. & A. Reagent, narrow mouth** capacity 250 cc., height 17.5 cm...**each** .60

No.		No.	
E101.	Sulfuric Acid, Con. H_2SO_4	E114.	Barium Chloride $BaCl_2$
E102.	Sulfuric Acid, Dil. H_2SO_4	E116.	Blank.
E103.	Nitric Acid, Con. HNO_3	E122.	Ammonium sulfide $(NH_4)_2S$ (Amber)
E104.	Nitric Acid, Dil. HNO_3	E126.	Alcohol C_2H_5OH
E105.	Hydrochloric Acid, Con. HCl	E129.	Sodium Phosphate Na_2HPO_4
E106.	Hydrochloric Acid, Dil. HCl	E130.	Ammonium Oxalate $(NH_4)_2C_2O_4$
E107.	Hydrogen Sulfide H_2S (Amber)	E131.	Acetic Acid $HC_2H_3O_2$
E108.	Ammonium Hydroxide NH_4OH	E145.	Silver Nitrate $AgNO_3$ (Amber)
E109.	Ammonium Chloride NH_4Cl	E150.	Potassium Hydroxide KOH
E110.	Ammonium Carbonate $(NH_4)_2CO_3$	E151.	Calcium Hydroxide $Ca(OH)_2$
E111.	Sodium Hydroxide NaOH	E152.	Lead Acetate $Pb(C_2H_3O_2)_2$
E112.	Sodium Carbonate Na_2Co_3	E154.	Ferrous Sulfate $FeSO_4$
		E159.	Ether $(C_2H_5)_2O$

962. **BOTTLES—E. & A. Reagent, narrow mouth,** capacity 500 cc., height 20 cm.....**each** **.70**

No.		No.	
E204.	Ammonium Hydroxide NH_4OH	E219.	Nitric Acid, Con. HNO_3
E222.	Hydrochloric Acid, Con. HCl	E232.	Nitric Acid, Dil. HNO_3
E231.	Hydrochloric Acid, Dil. HCl	E220.	Sulfuric Acid, Con. H_2SO_4
		E211.	Blank

964. **BOTTLES—E. & A. Reagent, narrow mouth,** capacity 1000 cc., height 25 cm.....**each** **.80**

E501.	Sulfuric Acid, Con. H_2SO_4	E505.	Hydrochloric Acid, Con. HCl
E502.	Sulfuric Acid, Dil. H_2SO_4	E506.	Hydrochloric Acid, Dil. HCl
E503.	Nitric Acid, Con. HNO_3	E511.	Blank
E504.	Nitric Acid, Dil. HNO_3	E512.	Ammonium Hydroxide NH_4OH

966. **BOTTLES—E. & A. Reagent, wide mouth,** capacity 125 cc., height 11.5 cm.....**each** **.55**

E301.	Sodium Carbonate Na_2CO_3	E305.	Ferrous Sulfate $FeSO_4$
E302.	Potassium Nitrate KNO_3	E312.	Test Paper
E303.	Potassium Cyanide KCN	E313.	Sodium Ammonium Hydrogen Phosphate. $Na(NH_4)HPO_4+4H_2O$
E304.	Borax $Na_2B_4O_7$		

968. **BOTTLES—E. & A. Reagent,** above described. Set of 40, as listed below, consisting of 28 narrow mouth 125 cc., 5 narrow mouth 250 cc., 6 wide mouth 125 cc., and one 30 cc. dropping bottle **22.00**

970. **BOTTLES—Filled with C. P. Reagents,** sealed and packed in shipping order..... **price on application**

8 oz. Bottles
Sulfuric Acid (dil.) H_2SO_4
Hydrochloric Acid HCl
Nitric Acid HNO_3
Ammonium Hydroxide NH_4OH
Blank

4 oz. Bottles
Sulfuric Acid con. H_2SO_4
Ammonium Chloride $(NH_4)Cl$
Ammonium Oxalate $(NH_4)_2C_2O_4$
Ammonium Sulfocyanate $(NH_4)CNS$
Ammonium Molybdate $(NH_4)_2MoO_4$
Ammonium Carbonate $(NH_4)_2CO_3$
Acetic Acid $HC_2H_3O_2$
Alcohol $(C_2H_5)OH$
Silver Nitrate $AgNO_3$ (Amber)
Barium Chloride $BaCl_2$
Calcium Hydroxide $Ca(OH)_2$
Cupric Sulfate $CuSO_4$
Ferric Chloride $FeCl_3$
Hydrogen Sulfide H_2S (Amber)
Ammonium Sulfide $(NH_4)_2S$ (Amber)
Magnesium Sulfate $MgSO_4$
Mercuric Chloride $HgCl_2$
Mercurous Nitrate $Hg_2(NO_3)_2$
Platinum Chloride $PtCl_4$ (1 oz. dropping bottle)
Lead Acetate $Pb(C_2H_3O_2)_2$
Potassium Dichromate $K_2Cr_2O_7$
Potassium Ferrocyanide $K_4Fe(CN)_6$
Potassium Iodide KI
Sodium Carbonate Na_2CO_3
Sodium Acetate $NaC_2H_3O_2$
Sodium Phosphate Na_2HPO_4
Uranium Acetate $UO_2(C_2H_3O_2)_2$
Ether $(C_2H_5)_2O$
1 Blank

4 oz. Saltmouth Bottles
Sodium Carbonate Na_2CO_3
Borax $Na_2B_4O_7$
Ferrous Sulfate $FeSO_4$
Potassium Cyanide KCN
Ammon. Sod. Phosphate $Na(NH_4)HPO_4 +4H_2O$
Test Paper

976

Bottles—Reagent,

with raised, ground glass letters

These Bottles have the names and formulas distinctly blown in the glass; all letters are ground to make them perfectly visible. Any names not included in the list can be *engraved* to order at an extra charge.

Please order by number.

986

972. **BOTTLES—Reagent.** Set of 40, consisting of 28 narrow mouth 4 oz., 5 narrow mouth 8 oz. and 6 wide mouth 4 oz., same names as set No. 970 ..... **9.00**

974. **Ditto—filled with C. P. Reagents,** sealed and packed in shipping order ..... **price on application**

976. **BOTTLES—Reagent, narrow mouth,** 1 oz., height 3⅝ inches .....**each** **.18**
dozen **1.80**

No.		No.	
325.	Silver Nitrate $AgNO_3$ (Amber)	336.	Gold Chloride $AuCl_3$
326.	Cobaltous Nitrate $Co(NO_3)_2$	341.	Blank
327.	Platinum Chloride $PtCl_4$		

978. **BOTTLES—Reagent, narrow mouth, one quarter pint, ⅛ liter, height 5¼ inches** ..... each .25
dozen 2.60

1. Hydrogen Sulfide H_2S (Amber)
2. Hydrochloric Acid HCl
419. Hydrochloric Acid Con. HCl
3. Acetic Acid $HC_2H_3O_2$
4. Sulfuric Acid H_2SO_4
420. Sulfuric Acid Con. H_2SO_4
5. Nitric Acid HNO_3
422. Nitric Acid Con. HNO_3
6. Potassium Ferrocyanide $K_4Fe(CN)_6$
7. Potassium Sulfocyanate KCNS
8. Potassium Carbonate K_2CO_3
9. Potassium Sulfate K_2SO_4
10. Potassium Iodide KI
11. Potassium Ferricyanide $K_3Fe(CN)_6$
12. Potassium Hydroxide KOH
13. Potassium Dichromate $K_2Cr_2O_7$
14. Sodium Phosphate Na_2HPO_4
15. Ammonium Hydroxide NH_4OH
16. Ammonium Sulfide $(NH_4)_2S$ (Amber)
17. Ammonium Chloride NH_4Cl
18. Ammonium Carbonate $(NH_4)_2CO_3$
19. Ammonium Oxalate $(NH_4)_2C_2O_4$
20. Barium Chloride $BaCl_2$
21. Calcium Chloride $CaCl_2$
22. Calcium Sulfate $CaSO_4$
23. Calcium Hydroxide $Ca(OH)_2$
24. Magnesium Sulfate $MgSO_4$
25. Mercuric Chloride $HgCl_2$
26. Silver Nitrate $AgNO_3$ (Amber)
27. Lead Acetate $Pb(C_2H_3O_2)_2$
28. Ferrous Sulfate $FeSO_4$
29. Ferric Chloride $FeCl_3$
30. Alcohol C_2H_5OH
31. Ammonium Sulfocyanate NH_4CNS
32. Barium Hydroxide $Ba(OH)_2$
33. Barium Carbonate $BaCO_3$
35. Ether $(C_2H_5)_2O$
36. Cupric Sulfate $CuSO_4$
37. Platinum Chloride $PtCl_4$
38, 39, 40. Blank
58. Fehling's Solution
59. Sodium Carbonate Na_2CO_3
60. Sodium Acetate $NaC_2H_3O_2$
61. Sodium Hydroxide NaOH
81. Stannous Chloride $SnCl_2$
82. Ammonium Molybdate $(NH_4)_2MoO_4$
83. Carbon Disulfide CS_2
86. Mercurous Nitrate $Hg_2(NO_3)_2$
87. Indigo Solution
88. Nessler's Solution
90. Magnesia Mixture
93. Oxalic Acid $H_2C_2O_4$
94. Picric Acid $C_6H_2OH(NO_2)_3$
96. Potassium Chromate K_2CrO_4
97. Ammonium Sulfhydrate NH_4HS
100. Mercuric Potassium Iodide
401. Barium Nitrate $Ba(NO_3)_2$
404. Silver Sulfate Ag_2SO_4
406. Bromine Water
407. Chloroform $CHCl_3$
408. Cochineal
409. Coralline
410. Litmus
411. Methyl-Orange
412. Phenolphthalein
413. Turmeric
414. Iodine Solution I+KI
415. Methyl Alcohol CH_3OH
416. Sodium Cobaltic Nitrite.
417. Sodium Thiosulfate $Na_2S_2O_3$

980. **BOTTLES—Reagent, narrow mouth, one half pint, ¼ liter, height 6½ inches**...each .30
dozen 3.20

101. Sulfuric Acid, Con. H_2SO_4
102. Sulfuric Acid, Dil. H_2SO_4
103. Nitric Acid, Con. HNO_3
104. Nitric Acid, Dil. HNO_3
105. Hydrochloric Acid, Con. HCl
106. Hydrochloric Acid, Dil. HCl
107. Hydrogen Sulfide H_2S (Amber)
108. Ammonium Hydroxide NH_4OH
109. Ammonium Chloride NH_4Cl
110. Ammonium Carbonate $(NH_4)_2CO_3$
111. Sodium Hydroxide NaOH
112. Sodium Carbonate Na_2CO_3
114. Barium Chloride $BaCl_2$
116. Blank
122. Ammonium Sulfide $(NH_4)_2S$ (Amber)
126. Alcohol C_2H_5OH
129. Sodium Phosphate Na_2HPO_4
130. Ammonium Oxalate $(NH_4)_2C_2O_4$
131. Acetic Acid $HC_2H_3O_2$
145. Silver Nitrate $AgNO_3$ (Amber)
150. Potassium Hydroxide KOH
151. Calcium Hydroxide $Ca(OH)_2$
152. Lead Acetate $Pb(C_2H_3O_2)_2$
153. Mercuric Chloride $HgCl_2$
154. Ferrous Sulfate $FeSO_4$
155. Ammonium Molybdate $(NH_4)_2MoO_4$
156. Stannous Chloride $SnCl_2$

982. **BOTTLES—Reagent, narrow mouth, one pint, ½ liter, height 7¾ inches**.....each .45
dozen 4.50

204. Ammonium Hydroxide NH_4OH
227. Ammonium Hydroxide Dil. NH_4OH
211. Blank
215. Sulfuric Acid H_2SO_4
220. Sulfuric Acid Con. H_2SO_4
216. Nitric Acid HNO_3
219. Nitric Acid Con. HNO_3
217. Hydrochloric Acid HCl
222. Hydrochloric Acid Con. HCl
218. Barium Chloride $BaCl_2$
221. Potassium Hydroxide KOH
223. Calcium Hydroxide $Ca(OH)_2$
224. Ferrous Sulfate $FeSO_4$
225. Calcium Sulfate $CaSO_4$
226. Hydrodisodic Phosphate Na_2HPO_4
228. Sodium Hydroxide Dil. NaOH
229. Ammonium Sulfide Dil. $(NH_4)_2S$
230. Ether $(C_2H_5)_2O$
239. Potassium Dichromate $K_2Cr_2O_7$
240. Sodium Carbonate Na_2CO_3

984. **BOTTLES—Reagent, narrow mouth, one quart, 1 liter, height 9½ inches**.....each .65
dozen 6.60

501. Sulfuric Acid, Con. H_2SO_4
502. Sulfuric Acid, Dil. H_2SO_4
504. Nitric Acid, Dil. HNO_3
505. Hydrochloric Acid, Con. HCl
506. Hydrochloric Acid, Dil. HCl
511. Blank

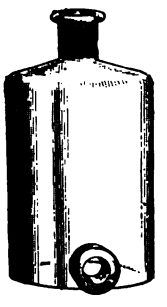
986. **BOTTLES—Reagent, wide mouth, 1 oz.** height 3⅛″ ..... each .18
dozen 1.80

No.		No.	
350.	Sodium Carbonate Na_2CO_3	365.	Ferrous Sulfate $FeSO_4$
351.	Borax $Na_2B_4O_7$	366.	Ferrous Sulfide FeS
353.	Sodium Acetate $NaC_2H_3O_2$	367.	Potassium Chlorate $KClO_3$
354.	Potassium Nitrate KNO_3	368.	Potassium Ferricyanide $K_3Fe(CN)_6$
358.	Potassium Cyanide KCN	369.	Sodium Bitartrate $NaHC_4H_4O_6$
361.	Am. Sod. Phosphate $NaNH_4HPO_4$	373.	Zinc Zn
364.	Copper Cu	374.	Ammonium Phosphate $(NH_4)_2HPO_4$
370.	Sodium Nitrate $NaNO_3$	375.	Blank
371.	Starch	376.	Sod. Pot. Carbonate $Na_2CO_3K_2CO_3$
372.	Test Paper.	377.	Phenyl Hydrazine $C_6H_5NHNH_2$

988. **BOTTLES—Reagent, wide mouth, 4 oz.,** height 4⅞″ ..... each .28
dozen 2.80

No.		No.	
301.	Sodium Carbonate Na_2CO_3	307.	Blank
302.	Sodium Nitrate KNO_3	312.	Test Paper
303.	Potassium Cyanide KCN	313.	Sod. Am. Hydrogen Phosphate $Na(NH_4)HPO_4{-}4H_2O$
304.	Borax $Na_2B_4O_7$		
305.	Ferrous Sulfate $FeSO_4$	314.	Ammonium Sulfate $(NH_4)_2SO_4$

Bottles of Various Kinds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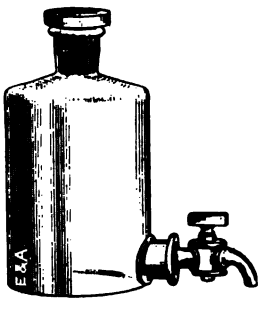

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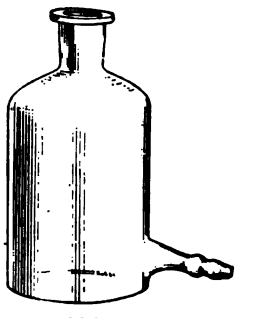
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990. **BOTTLE—Aspirator, of heavy glass,** with large tubulature at bottom for stopper.

Capacity, liters	⅛	¼	½	1	2
Each	.55	.60	1.00	1.60	2.00
Capacity, liters	4	8	12	20	32
Each	3.20	6.50	8.50	12.00	25.00

992. **BOTTLE—Aspirator, of heavy glass,** with stopper, and glass stopcock ground in outlet.

Capacity, liters	¼	½	1	2	4
Each	3.00	4.20	4.80	5.40	7.50
Capacity, liters		8	12	20	32
Each		12.60	15.50	21.00	36.00

994. **BOTTLE—Aspirator, heavy glass,** with narrow outlet for connecting rubber tubing.

Capacity, liters	⅛	¼	½	1	2	4	8
Each	.85	.95	1.40	2.10	2.50	3.75	7.20

996. **BOTTLE—Balsam, with ground glass cap,** and glass rod.

Capacity, cc.	30	60
Each	.50	.60

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998. **BOTTLE—Ceresine wax,** for hydrofluoric acid.

Capacity, cc.	30	150	250	500
Each	.40	.50	.60	.80

1000. **BOTTLE—Dropping square,** with rubber pipette stopper cap. 30 cc. ..... .12

1002. **BOTTLE—Dropping,** with ground in pipette, and rubber nipple.

Capacity, cc.	15	30	60
Each	.35	.38	.40

1004. **BOTTLE—Dropping,** with ball top pipette ground in.

Capacity, cc.	15	30	60
Each	.30	.35	.40

1006. **BOTTLE—Dropping low form,** with ball top pipette ground in.

Capacity, cc.	30	60
Each	.60	.65

1008. **BOTTLE—Dropping,** with thistle top pipette ground in, capacity 30 cc. ..... .25

1010. **BOTTLE—Acid dropping,** tall form, with long ground in stopper, and ground cap.

Capacity, cc.	30	60
Each	.40	.50

1012. **Ditto—low form,** same sizes and prices as No. 1010.

1014. **BOTTLE—Dropping "TK"** with grooved flat stopper; white glass.

Capacity, cc.	15	30	50	100	200
Each	.22	.25	.30	.35	.45
1016. **Ditto—Amber Glass**	.24	.28	.33	.38	.50

1018. **BOTTLE—Dropping** with grooved high stopper.

Capacity, cc.	15	30	50	100
Each	.22	.25	.30	.35

1020. **BOTTLE—Dropping,** Shuster with glass stopper, capacity 60 cc. ..... .60

1022. **Ditto—without stopper,** capacity 60 cc. ..... .40

1024. **BOTTLE—Dropping,** Salleron, capacity 30 cc. ..... .40

BOTTLE—Gas, see flasks.

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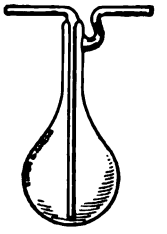
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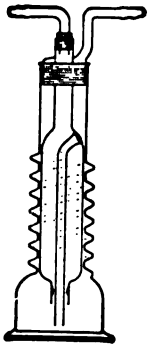
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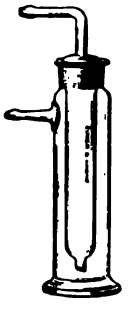
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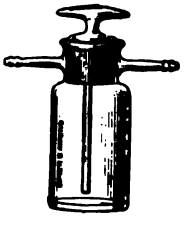
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1026. **BOTTLE—Gas Washing, Allihn,** double action with ground in stopper.

Capacity, cc.	250	500	1000	2000
Each	3.00	3.75	4.75	7.00

1028. **BOTTLE—Gas Washing, Allihn,** with valve to prevent liquid flowing back, ground in stopper.

Capacity, cc.	250	500	1000
Each	3.75	4.50	7.00

1030. **BOTTLE—Gas Washing, Sillimann,** with wide neck, fitted with rubber stopper.

Capacity, cc.	250	500
Each	2.25	3.00

1032. **BOTTLE—Gas Washing, Cloez.**

Capacity, cc.	125	250	500	1000
Each	1.25	1.40	1.90	2.35

1034. **BOTTLE—Gas Washing, Drexel,** low form, with ground in stopper.

Capacity, cc.	125	250	350	500	1000
Each	1.35	1.50	1.60	1.80	2.25

1036. **BOTTLE—Gas Washing, Drexel,** tall form, with ground in stopper.

Capacity, cc.	125	250	350	500	1000
Each	1.75	1.90	2.00	2.25	2.75

1038. **BOTTLE—Gas Washing, Friedrich.** With this bottle, the gas bubbles rise through a spiral channel of about 120 mm. long, insuring efficient absorption. The inner reflux tube prevents the liquid from rising up to the top, and insures a continual circulation; with ground in stopper **10.00**

1040. **BOTTLE—Gas Washing,** improved, for either solids or liquids.

Capacity, cc.	250	500	1000
Each	4.30	5.25	6.65

1042. **BOTTLE—Gas Washing, Habermann,** 250 cc. **2.00**

1044. **BOTTLE—Gas Washing, Muencke,** stoppered, Capacity 200 cc. **2.25**

1046. **BOTTLE—Gas Washing, Raikow,** Capacity 250 cc. **3.00**

BOTTLE—Gas Washing, Tubes—see Tubes.

1050 1052 1056 1058/1 1060 1064 1068 1070

1050. **BOTTLE—Homeopathic Vial,** best quality, long shape.

Capacity, dram	½	1	2	3	4	6	8
Dozen	.14	.14	.17	.23	.32	.42	.52
Gross	1.45	1.45	1.75	2.30	3.15	4.20	5.25

1052. **BOTTLE—Homeopathic Vial,** with metal screw cap.

Capacity, dram	1	2	3	4
Gross	3.25	3.75	4.25	5.50
Size, inches	3½ x ⅞		5½ x ⅞	
Gross		9.00		11.75

BOTTLE—Square or Round, with metal screw caps, cork lined; see Jars.

1054. **BOTTLE—Lead,** for hydrofluoric acid, stoppered.

Capacity, ozs.	4	8	16	32
Each	1.35	1.60	2.30	3.15

1056. **BOTTLE—Oil Immersion,** with glass rod and ground cap; capacity 20 cc. **1.00**

1058/1. **BOTTLE—Oil Immersion,** Mach, improved form with loose fitting metal cap and dropper; capacity 30 cc. **2.00**

1060. **BOTTLE—Oil Sample,** long form.

Capacity, ozs.	1	2	4	8
Each	.06	.08	.13	.20
Dozen	.60	.80	1.30	2.00

1062. **Ditto—with polished bottom;** capacity 4 ozs. ..... each **.20**
dozen **2.00**

1064. **BOTTLE—Pressure,** well annealed, with patent stopper.

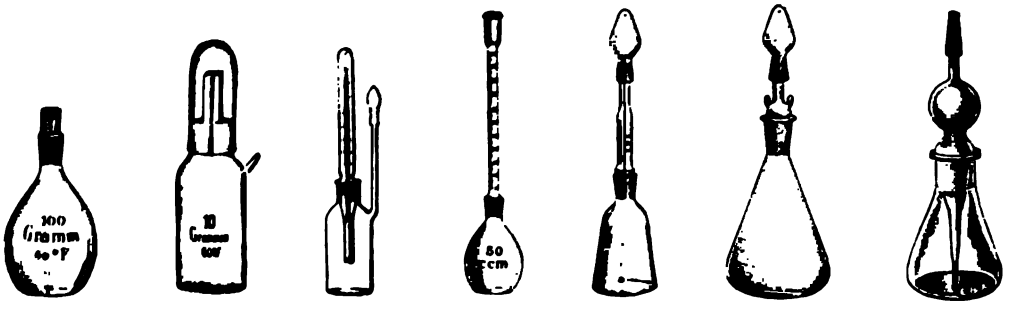
Capacity, cc.	60	100	200
Each	.60	.70	.80

1066. **BOTTLE—Pressure, E. & A.,** same shape as No. 1064, but heavier, with grooved glass stopper to tie over; capacity 250 cc. **1.20**

1068. **BOTTLE—Pressure, Saloman;** capacity 125 cc. **2.40**
Extra bottles ..... each **.80**

1070. **BOTTLE—Pressure, Lintner,** of heavy and well annealed glass, for digestion under pressure.

Capacity, cc.	125	250
Each	4.90	5.00



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1072. **BOTTLE—Specific Gravity,** unadjusted, with perforated stopper, same shape as No. 1074.

Capacity, cc.	1	2	5	10	25	50	100
Each	**1.10**	**1.20**	**1.30**	**1.40**	**1.45**	**1.50**	**1.90**

1074. **Ditto**—accurately adjusted, with perforated stopper.

Capacity, cc.	1	2	5	10	25	50	100
Each	**1.90**	**2.00**	**2.10**	**2.20**	**2.40**	**2.70**	**2.75**

1076. Number 1074—in paper box with tare weight.

Capacity, cc.	10	25	50	100
Each	**3.50**	**3.70**	**4.00**	**4.25**

1078. **BOTTLE—Specific Gravity, Boot,** Morgan modification, double wall with vacuum, which keeps the temperature inside constant, making it most serviceable for use with liquids, such as ether, that are easily affected by temperature.

Capacity, cc.	10	25	50	100
Each	**5.00**	**5.50**	**6.00**	**6.60**

1080. **BOTTLE—Specific Gravity,** with ground in centigrade thermometer, divided in 1/5 degree, and stoppered capillary tube.

Capacity, cc.	10	25	50	100
Each	**3.85**	**4.20**	**4.50**	**5.00**

1084. **BOTTLE—Specific Gravity, Squibb,** for liquids.

Capacity, cc.	25	50	100
Each	**4.00**	**4.50**	**5.00**

1086. **BOTTLE—Specific Gravity, Walker,** for very fluid liquids (Bureau of Chemistry, Bulletin No. 109, revised, of the U. S. Dept. of Agriculture) **2.45**

1088. **BOTTLE—Specific Gravity, Walker,** for very viscous liquids **2.30**

1090. **BOTTLE—Weighing, Hill.** Capacity about 30 cc., with bulb pipette fitted with glass cap to prevent evaporation of volatile liquids. The use of this bottle obviates loss by evaporation during weighing, and also loss by spilling in transferring the portion of the liquid intended for analysis **1.70**

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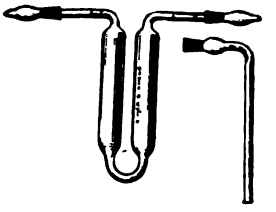
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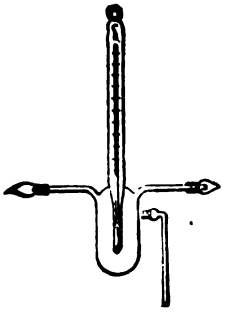
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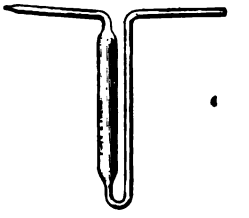
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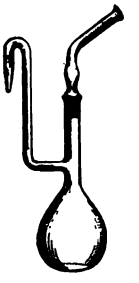
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1092. **BOTTLE—Specific Gravity, Regnault,** for liquids.

Capacity, cc.	25	50
Each	1.10	1.30

1093. **BOTTLE—Specific Gravity,** with stopper, ground to fit. (Findlay's Physical Chemistry, Fig. 1.)

Capacity, cc.	25	50
Each	1.25	1.50

1094. **BOTTLE—Specific Gravity, Sprengel,** with ground in suction tube **1.60**

1096. **BOTTLE—Specific Gravity, Sprengel,** with thermometer and ground in suction tube.. **7.00**

1098. **BOTTLE—Specific Gravity, Nicholl Tube,** for liquids ..... **.50**

1099. **BOTTLE—Specific Gravity,** according to Hulett, similar to a Sprengel bottle, but made so as to stand on the balance.

Capacity, cc.	25	50
Each	2.00	2.25

1100. **BOTTLE—Specific Gravity, Regnault,** for solids.

Capacity, cc.	25	50
Each	1.00	1.25

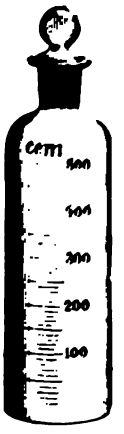
1102. **BOTTLE—Specific Gravity, Hogarth,** for iron ores **2.00**

1104. **BOTTLE—Specific Gravity, Hubbard,** for semi-solid bitumens; consists of a heavy tube, with ground in solid stopper, perforated with a hole 1.6 mm. diameter..... **2.00**

1105. **BOTTLE—Specific Gravity, Hubbard, modified,** for semi-solid bitumens; Erlenmeyer shape, with ground in glass stopper perforated with a hole 1.6 mm. diameter..... **2.00**

1106. **BOTTLE—Specific Gravity, Thoerner Volumeter,** for solids, especially coke and charcoal; determining at the same time the porosity of such substances; graduated from 0-100 cc. in 1/5 cc., including cylinder **3.60**

BOTTLE—Specific Gravity, for cement, see Cement Testing Apparatus.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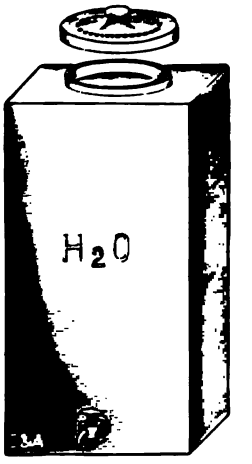

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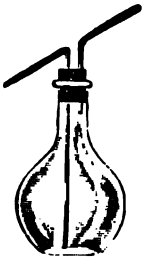
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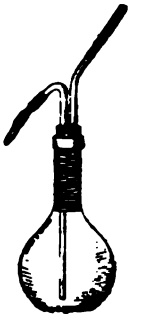
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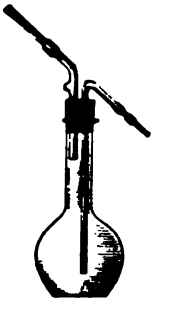
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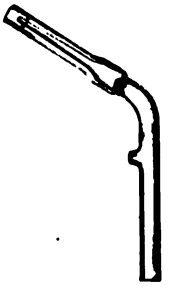
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1112. **BOTTLE—Mixing,** glass stoppered, graduated in cc.

Capacity, cc.	250	500	1000
Each	1.70	2.60	3.60

1114. **BOTTLE—Mariotte, Stoneware,** acid proof, with water level and stoneware bib stopcock ground in the outlet. Capacity 50 liters **22.00**

1116. **BOTTLE—Water, Stoneware,** rectangular, with stoneware bib stopcock ground in the outlet.
Capacity, 100 liters **48.00**

1118. **BOTTLE—Washing,** best quality ring neck flask fitted with rubber stopper and movable exit tube.

Capacity, cc.	250	360	500	750	1000	2000
Each	.40	.50	.70	.85	1.00	1.30

1120. **Ditto**—Fitted with handle.

Capacity, cc.	250	360	500	750	1000	2000
Each	2.10	2.20	2.45	2.60	2.70	3.00

1122. **BOTTLE**—With wicker covered neck, for hot water; including rubber stopper and glass tubes.

Capacity, cc.	500	1000
Each	1.25	1.65

1124. **BOTTLE—Washing, Griffin Continuous flow.** The action is simple and almost self-explanatory. When holding the washing bottle the hole "A" is closed by the thumb; as soon as air is blown down the inflow tube and the mouth removed, the valve B is blown back by the excess pressure; this pressure is now quite sufficient to force a stream of water through the jet, but the current may be stopped immediately by removing the thumb from the hole "A."

As the cessation of the current is practically instantaneous, the wash Bottle will be of advantage in filling small measures, etc., to a fixed volume.

Capacity, cc.	250	360	500	750	1000
Each	1.20	1.25	1.50	1.65	1.80

1126. The tube only for above ..... **.75**

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1128. **BOTTLE—Washing,** with safety mouthpiece, and movable glass exit tube.

Capacity, cc.	250	500	1000
Each	**1.20**	**1.70**	**2.00**

1130. **BOTTLE—Washing,** with rubber bulb, with air valve giving a constant flow for washing with hot water, etc.; capacity 500 cc. complete **1.30**

1132. **BOTTLE—Washing,** with tubulated glass stopper, ground into the neck.

Capacity, cc.	250	500	1000
Each	**1.50**	**1.75**	**2.25**

1134. **BOTTLE—Washing,** with tubulated glass stopper, ground in, and tubes each fitted with glass stopcock, for volatile liquids.

Capacity, cc.	250	500	1000
Each	**5.00**	**5.50**	**6.00**

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1136. **BOTTLE—Weighing Tube,** round bottom, ground in glass stopper.

Height, mm	50	65	75	100	125
Diameter, mm	15	15	22	25	25
Each	**.50**	**.55**	**.60**	**.65**	**.75**

1138. **BOTTLE—Weighing Tube,** set of two, one sliding into the other, each 5 cm. long **per set** **.30**

1140. **BOTTLE—Weighing, flat bottom,** without neck, ground in glass stopper.

Height, mm	50	50	50	50	65	65
Diameter, mm	15	25	30	40	15	45
Each	**.50**	**.55**	**.65**	**.70**	**.55**	**1.00**
Height, mm		75	75	100	100	125
Diameter, mm		22	40	25	40	25
Each		**.55**	**.90**	**.60**	**1.00**	**.75**

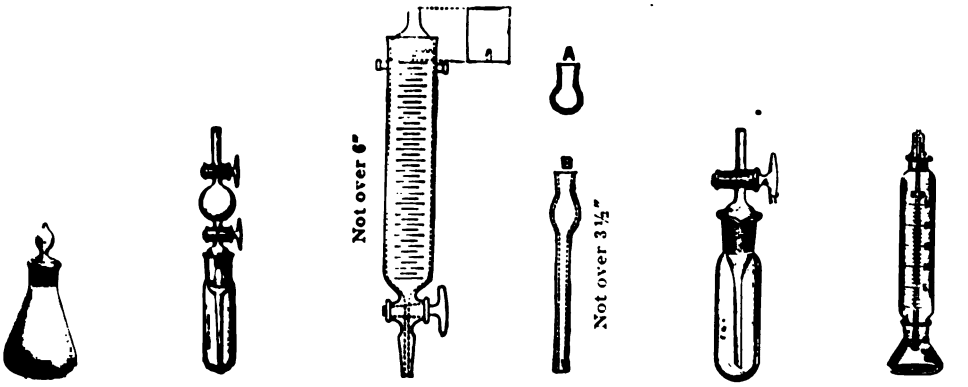
1142. **BOTTLE—Weighing,** with contracted neck and ground in glass stopper.

Height, mm	50	50	50	50	75
Diameter, mm	25	30	40	65	40
Each	**.65**	**.80**	**1.00**	**1.70**	**1.05**

1144. **BOTTLE—Weighing,** extra wide, ground in glass stopper.

Height, mm	30	30	30
Diameter, mm	50	65	70
Each	**1.15**	**1.50**	**1.75**

1144/1. **BOTTLE—Weighing,** for coal analysis, with cover ground airtight on the outside, dia. 25 mm., height 20 mm. **1.10**



1146 1152 1155/1 1154 1155

1146. **BOTTLE—Weighing, Conical,** low shape, ground in glass stopper.

Capacity, cc.	15	30	60
Each	.50	.65	.90

1152. **BOTTLE—Weighing Pipette, Lunge,** for fuming acids, etc., capacity about 15 cc..... **3.65**

1154. **BOTTLE—Weighing Pipette, Grethan,** for fuming acids, etc. **3.00**

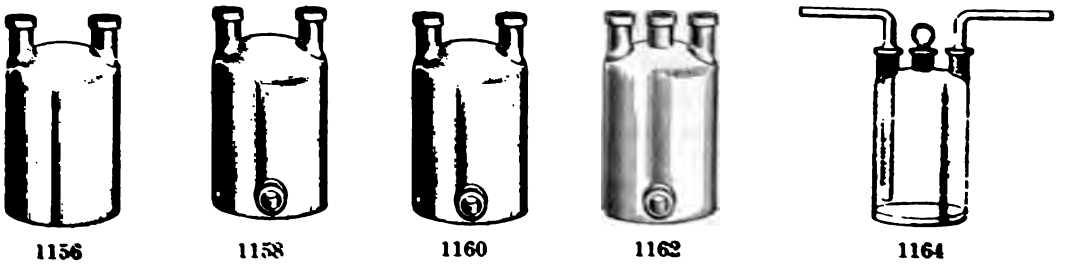
1155. **BOTTLE—Weighing Burette—Bailey** **3.75**

This burette is most useful for weighing out liquids, especially oils and volatile liquids. It can be placed directly on the balance pan. The graduations (30 cc. in ½) facilitate the weighing out of definite quantities when it is necessary to use approximately the same weight of sample. The three joints are accurately ground. The outlet and ground tip of the glass rod are of such size and shape that the flow of liquid can be adjusted from a drop to a free flow with the rod tip removed from the opening. The burette is weighed before and after the sample is taken. The bottom vessel serves as a base to support the burette, also as a catch cap for any drops or leakage.

1155 1. **BOTTLE—Weighing Burette, Burkhard,** for liquids **4.50**

Cup A is used to prevent fuming while weighing, etc. B is made preferably for oil or other material that would cause spattering. Capacity 30 cc.

Other sizes to order.



1156 1158 1160 1162 1164

1156. **BOTTLE—Woulff,** heavy glass with 2 necks.

Capacity, cc.	125	250	500	750	1000	2000	4000	8000
Each	2.25	2.75	3.00	3.50	4.00	5.00	6.70	10.50

1158. **Ditto—with 3 necks.**

Capacity, cc.	125	250	500	750	1000	2000	4000	8000
Each	2.50	3.00	3.50	4.00	4.50	5.00	7.20	11.50

1160. **BOTTLE—Woulff,** with 2 necks and outlet at bottom.

Capacity, cc.	250	500	1000	2000	4000	8000
Each	3.50	4.00	5.00	7.50	9.00	12.50

1162. **Ditto—with 3 necks.**

Capacity, cc.	250	500	1000	2000	4000	8000
Each	4.00	4.00	5.50	7.50	9.00	13.00

1164. **BOTTLE—Woulff,** with 3 necks, centre one stoppered, delivery tubes ground into the other necks.

Capacity, cc.	125	250	500	1000
Each	3.00	4.25	4.85	6.00

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1170. **BOTTLE REST—of porcelain,** to place under bottle containing acids, etc., for protecting table. Diameter, inside, cm. 7 8 13½

Each ..... .40 .50 .70

1174. **BOXES—Pasteboard,** round, assorted colors.

No.	1	2	3	4
Size, inches	1¼x⅜	1½x7/16	1¾x9/16	2 1/16x11/16
Gross	2.50	2.75	3.00	3.75

No.	5	6	7	8
Size, inches	2 7/16x⅞	2¾x1	3x1 3/16	3 7/16x1 7/16
Gross	4.75	5.50	7.00	9.50

No.	9	10
Size, inches	3 13/16x1 9/16	4¼x1 11/16
Gross	11.50	14.00

1176. **BOXES—Pasteboard,** rectangular, white glazed paper.

No.	47	48	49
Size, inches	2¼x1¼x⅝	2½x1½x¾	2¾x1¾x⅞
Gross	2.50	2.60	2.75

1178. **BOXES—Turned Wood.**

Size, ozs.	⅛	¼	½	1	2	3	4	6	8
Gross	1.20	1.50	2.00	3.00	5.00	6.50	8.50	9.50	11.50

1180. **BOXES—Seamless Tin.**

Size, ozs.	⅛	¼	½	1	2	3	4	6	8
Gross	1.00	1.25	1.80	2.40	3.80	5.00	5.75	6.60	8.40

BOXES for slides, etc., see Bacteriological Catalog, Section I.

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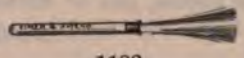

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1182. **BRUSH—Acid,** of spun glass, with quill handle ..... .40

1184. **BRUSH—Assay,** for lead buttons 1.15

1186. **BRUSH—Beaker,** with long wooden handle ..... .20

1190. **BRUSH—Bottle,** small sizes with brass handle, large size with rattan handle.

Length, inches	10	12	15	25
Each	.10	.13	.16	.20

1192. **BRUSH—Bottle,** for large mouth bottles and jars; 4 rows ..... .35

1194. **BRUSH—Flat Bristle,** tin bound, firmly set; for cleaning ore crushers, etc.

Width, inches	2	3	4	5
Each	.30	.60	1.10	1.80

1196. **BRUSH—Buckboard,** width 8 inches, length below binding 2¼ inches 2.00

1197. **BRUSH—Black bristle,** conical shape, with tuft end, for cleaning cylinders or jars, 12 inches long ..... .35

1197/1 1197/2 1198 1200 1202 1204 1206

1204/1

1210

1204/2

1212

1197/1. **BRUSH—Black and White Bristles,** with 2 tufts on end to reach corners of large mouth bottles, jars or cylinders, 4 rows ..... .45

1197/2. **BRUSH**—Bottle with flexible steel spring enabling the brush to reach every part of the bottle ..... .35

1198. **BRUSH—Burette, with wire handle;** length 3 feet ..... .15

1199. **BRUSH—Bristle, with tuft in centre** to clean open narrow tubes; 18 inches long ..... each .08

1200. **BRUSH—Camel Hair pencils,** best quality. dozen .80

Size	small	medium	large	extra large	double quill
Dozen	.30	.40	.50		6.60

1202. **BRUSH—Camel Hair, flat,** best quality; for cleaning scale pans, etc.

Width, inches	½	1	1½	2
Each	.20	.25	.35	.50

1202/1. **BRUSH—Camel Hair,** with wooden handle and metal ferrule.

Length of hair, inches	¾	1	1¼
Each	.15	.25	.35

1204. **BRUSH—Flask,** with pliable end which adapts itself to the curvature of the flask, facilitating thorough cleaning ..... .40

1204/1. **BRUSH**—for cleaning any size Pipette ..... .15

1204/2. **BRUSH**—For Cleaning Milk Test Bottles ..... dozen 1.20

1205. **BRUSH—Test Tube,** with tufted ends, length of bristle part 3 inches, diam. of bristle 1⅛ inches ..... each .08
Cut same as 1204/2 but with bent end. dozen .80

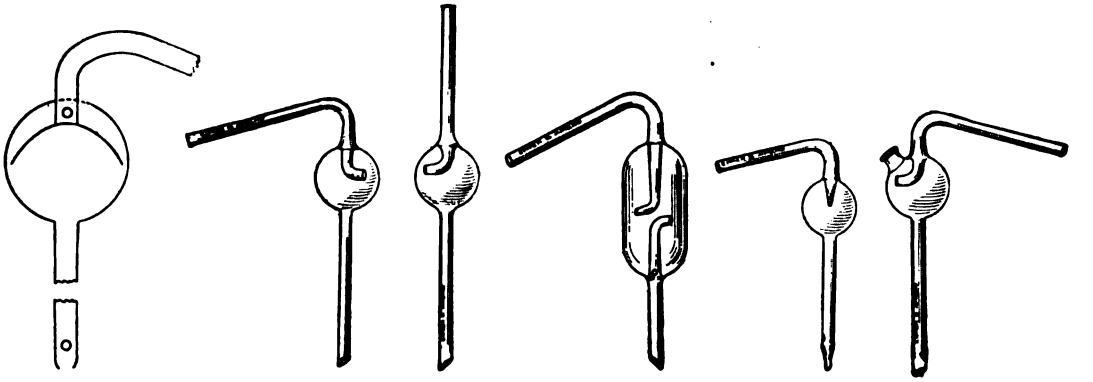
1206. **BRUSH—Test Tube,** on tinned iron wire, bristle end ..... each .07
dozen .60

1208. **Ditto—On brass wire,** bristle end ..... each .08
dozen .75

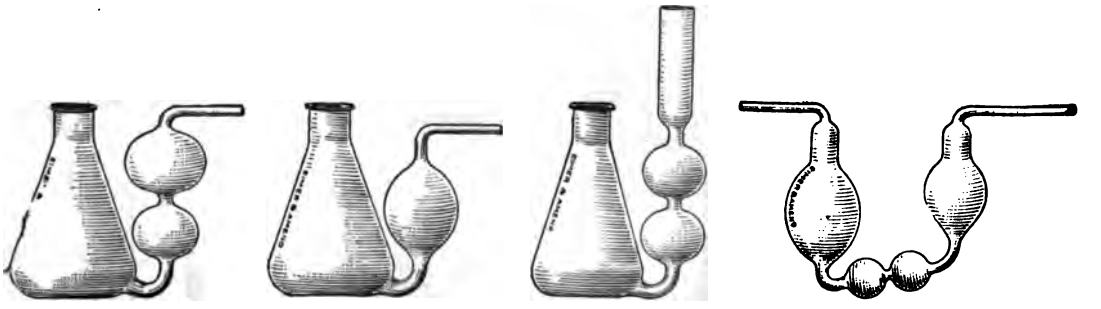
1210. **BRUSH—On brass wire,** sponge end ..... each .10
dozen .80

1212. **BRUSH—Rattan handle,** sponge end ..... each .10
dozen .90

1214. **BRUSH—Narrow Tube** ..... dozen .30
gross 2.75



1215 1216 1218 1220 1222 1224



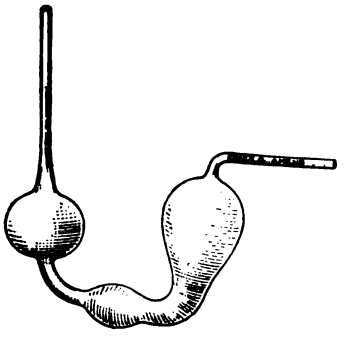
1226 1228 1230 1232

BUCKING BOARD—See Crusher Plate No. 2414/6.

1215.	**BULB—Connecting,** for rapid distilling, specially designed to prevent spraying	**1.75**
1215/1.	**Ditto—of Pyrex** Glass	**2.50**
1216.	**BULB—Kjeldahl Connecting,** with bent connecting tube	**.60**
1217.	**Ditto—of Pyrex** Glass	**1.00**
1218.	**BULB—**With straight connecting tube, for bending to any desired angle	**.60**
1219.	**Ditto—of Pyrex** Glass	**1.00**
1220.	**BULB—Kjeldahl Connecting,** cylindrical shape	**.90**
1221.	**Ditto—of Pyrex** Glass	**1.75**
1222.	**BULB—Hopkin, New form,** for rapid work	**.65**
1223.	**Ditto—of Pyrex** Glass	**1.10**
1224.	**BULB—Jenning, new form,** especially for water analysis; with tubulature in the bulb, which permits the introduction of water or permanganate solution without removing the stopper	**.75**
1225.	**Ditto—of Pyrex** Glass	**1.25**
1226.	**BULB—Nitrogen, Fresenius.**	

Capacity of flask, cc.	125	250
Each	**1.25**	**1.40**

1228.	**BULB—Nitrogen, Volhard improved**	**1.25**
1230.	**Ditto—Latest form**	**1.30**
1232.	**BULB—Nitrogen, Troilius**	**1.10**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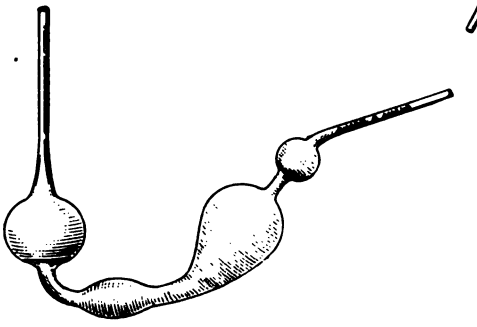
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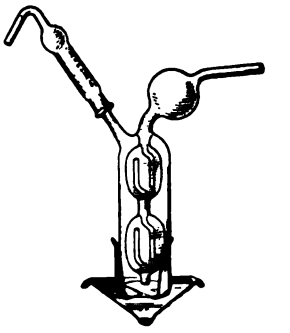
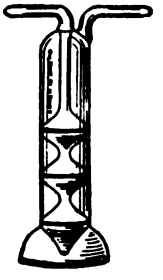

1238

1234. **BULB—Nitrogen, Varrentrap & Will,** with 3 bulbs ..... **.65**
1236. **Ditto**—With 4 bulbs ..... **.80**
1238. **BULB—Potash, Bender & Holbein,** with aluminum base **3.00**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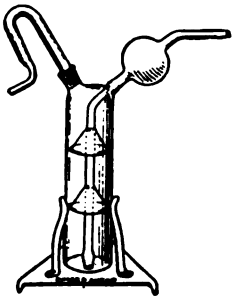
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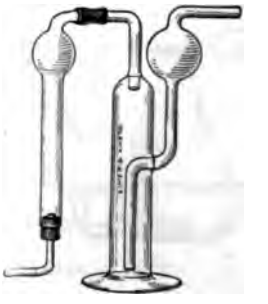
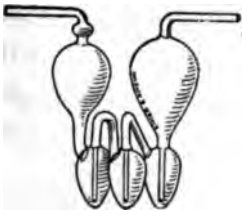

1248

1240. **BULB—Bowen,** insures thorough absorption; small size **2.00**
1242. **Ditto**—large size **2.75**
1244. **BULB—Delisle,** with aluminum base **3.00**
1246. **BULB—Gomberg** **3.00**
1248. **BULB—C. M. Johnson** **1.25**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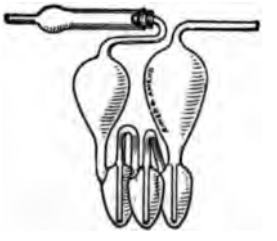
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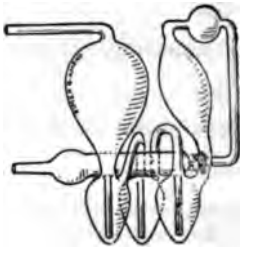
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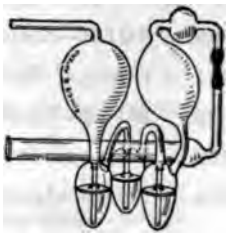
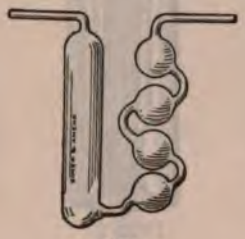

1260

1250. **BULB—Geissler** **1.75**
1252. **Ditto**—with drying tube attached **1.80**
1254. **BULB—Geissler,** with drying tube ground on **2.75**
1256. **BULB—Geissler,** with drying tube between the bulbs **2.00**
1258. **Ditto**—with drying tube between the bulbs, ground on **2.75**
1260. **Bulb—Wetzel** **3.00**

1262



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1271/2

1262. **BULB—Konig** **3.50**

1264. **BULB—Koeninck** ..... **.80**

1266. **BULB—Liebig** ..... **.65**

BULB—Norris for Sulfur—see Sulfur Apparatus.

1268. **BULB—Winkler, spiral form.**

Size	Small	Medium	Large
Each	**2.75**	**3.50**	**4.75**

1270. **BULB—Winkler Kyll** **3.50**

1271. **BULB—Fleming,** one piece **3.50**

1271/1. **BULB—Fleming-Martin,** two piece **5.00**

1271/2. **BULB—Mercury Sealed (Patented), Latest Fleming Design, two chamber type**... **7.50**

Besides possessing all the advantages which have made the regular Fleming bulbs the most popular for CO_2 determinations by the combustion method, it has the following remarkable added features:

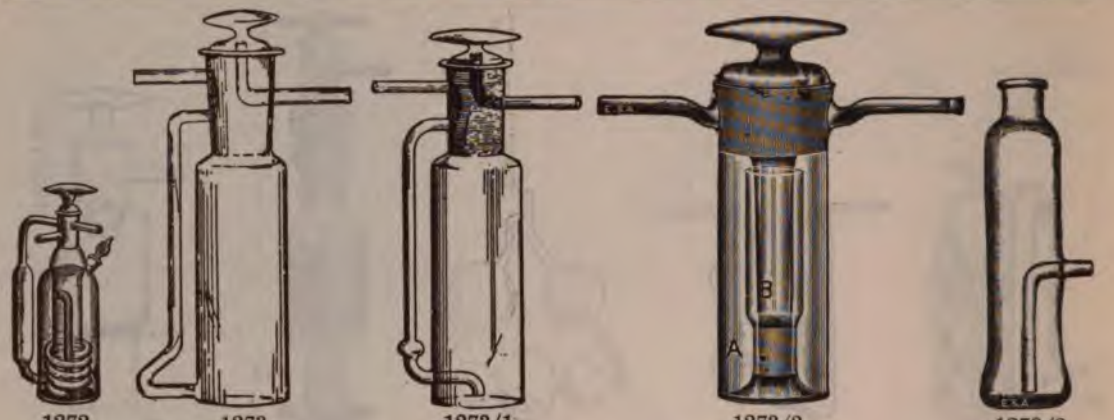
1. It is automatically sealed and maintains a perfect atmosphere of oxygen within the apparatus.
2. Perfect weighing conditions. There are no inlet nor outlet valves to manipulate, as these are automatically operated by the mercury traps. The tube is disconnected and weighed without further handling. Hours later the same atmosphere will be in the apparatus, its weight will be the same and the bulb can be used again without running a blank.
3. Eliminates errors for the following reasons: (a) Oxygen cannot escape, air cannot enter. This also applies to moisture. (b) No danger of entrapping oxygen under pressure.
4. Cuts down the number of weighings, speeds up the work of the laboratory and therefore lessens the cost of each analysis made.

The apparatus will absorb over 500 combustions when operating on 1.5 grams sample of .50% C. steel.

Remarkably accurate results are obtained with this apparatus.

1271/3. **BULB**—Similar to No. 1271/2, but **single chamber type** for use with **"Ascarite"**..... **7.50**

BULLETIN FULLY DESCRIBING FLEMING METHOD ON REQUEST.



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1272. **BULB—Vanier (Patented),** combined with drying tube **10.00**

1273. **BULB—Nesbitt,** for the rapid absorption of carbon dioxide with Soda Lime. A turn of the stopper closes both inlet and outlet tubes **4.50**

1273/1. **BULB—Nesbitt, improved form with inlet tube** extended inside of bulb and bent downward to diffuse gas through entire bottle **5.25**

1273/2. **BULB—Fisher Absorption Bottle** (Patented) Designed on the principle of a U tube, but with "one leg inside the other." One turn of the stopper turns off the inlet and outlet. When turned off, the inside chamber is cut off entirely from the outside chamber. Easily charged, light in weight; for all combustions where dry reagents are employed. Particularly popular among Organic Chemists **7.50**

1273/3. **BULB—Midvale, Absorption, designed by H. L. Frevert.** A new tube for "Ascarite" (a sodium hydroxide asbestos absorbent mixture). No other absorbent or glass wool necessary **2.00**

1273/4. **"ASCARITE,"** per pound **4.50**

1276 1278 1280

1274 1282 1284 1286

1274. **BULB—Levelling of glass,** for use as mercury or water reservoir.

Capacity, ozs.	4	8	16	32
Each	.50	.70	.80	1.00

1276. **BULB—Atomizer, of rubber,** single; with valves ..... **.40**

1278. **BULB—Constant Pressure,** black rubber, double; covered with net **1.65**

1280. **BULB—Double, white rubber;** without netting ..... **.60**

BULB—Dewar, Vacuum, see Tube, Vacuum.

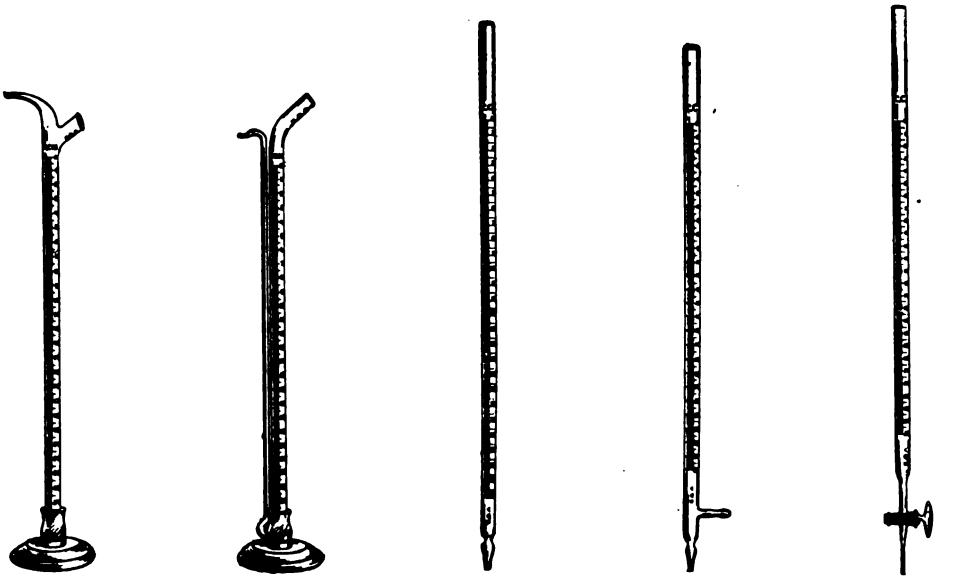
1282. **BULB—Orsat, of pure rubber,** with long flexible tube for attaching to Orsat Apparatus pipettes ..... **.70**

1284. **BULB—Pipette, of rubber.** The two smallest sizes are as shape "a," the other sizes shape "b."

Capacity, cc.	2	5	10	25	50	100
Each	.03	.05	.15	.20	.24	.55
Doz.	.30	.50	1.50	2.00	2.40	5.50

1286. **BULB—Sampling, double acting;** for taking samples for gas analysis ..... **.75**

1288. **BULB—of thin rubber;** for use with Scheibler Calcimeter ..... **.20**



1300 1302 1304 1308 1310

Burettes

The burettes listed below are those in ordinary use. Special Burettes made to order on request.

1300. **BURETTE—Bink,** on polished wooden base.

Capacity, cc	10	25	50	100
Subdivisions, cc.	1/10	1/10	1/10	1/5
Each	**2.00**	**2.40**	**2.60**	**3.00**

1302. **BURETTE—Gay Lussac,** on polished wooden base.

Capacity, cc	25	50	100
Subdivisions, cc.	1/10	1/10	1/5
Each	**2.70**	**3.20**	**3.75**

1304. **BURETTE—Mohr,** for pinchcock, without fittings (fittings charged 25 cents extra).

Capacity, cc.	10	25	25	50	50	100	100
Subdivisions, cc.	1/10	1/10	1/20	1/5	1/10	1/5	1/10
Each	**.70**	**.70**	**.80**	**.90**	**1.00**	**1.20**	**1.50**

1305. **BURETTE—Standard,** see page 111.

1308. **BURETTE**—with side tube for refilling.

Capacity, cc.	25	50	100	100
Subdivisions, cc.	1/10	1/10	1/5	1/10
Each	**.95**	**1.25**	**1.50**	**1.75**

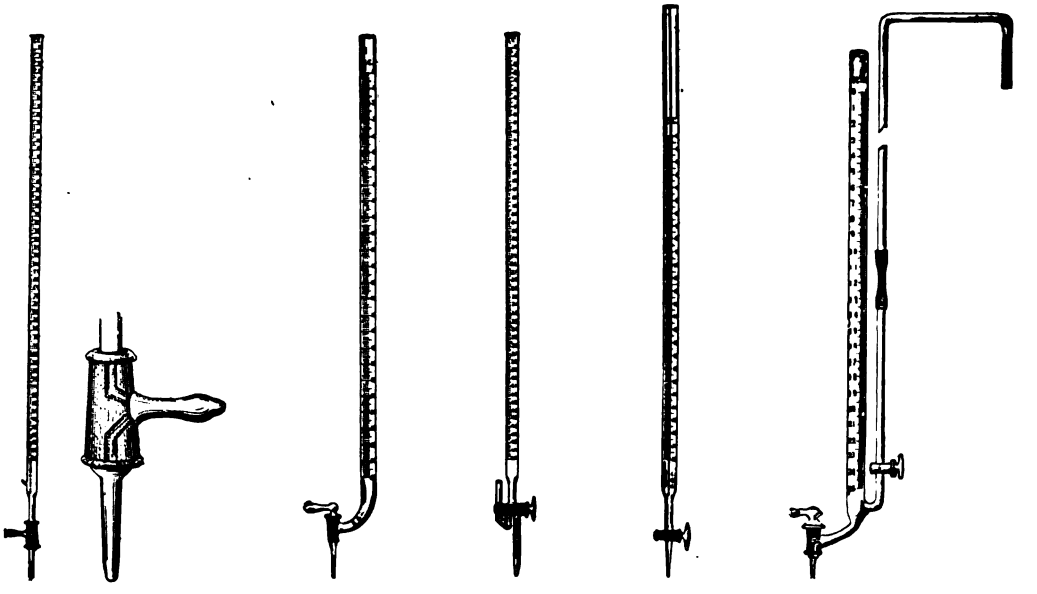
1310. **BURETTE—Geissler,** with straight glass stopcock, ground accurately.

Capacity, cc.	10	25	25	50	50	75	100	100
Subdivisions, cc.	1/10	1/10	1/20	1/5	1/10	1/10	1/5	1/10
Each	**1.80**	**1.90**	**2.00**	**2.00**	**2.10**	**2.25**	**2.35**	**2.50**

1310/1. **BURETTE—Geissler, of amber glass,** with straight glass stopcock, for Nitrate of Silver solutions, capacity 50 cc. in 1/10th **3.50**

1311. **BURETTE—Geissler,** with straight glass stopcock, with side tube for refilling.

Capacity, cc.	25	50	100
Subdivisions, cc.	1/10	1/10	1/10
Each	**2.10**	**2.30**	**2.75**



1312 1314 1316 1328 1332

1312. **BURETTE—with E. & A. Patented glass stopcock.** The socket or shell of the stopcock is movable, which has the distinct advantage, in comparison with ordinary Geissler stopcocks, that there is no loose stopper to fall out. The movable shell stays firmly seated, turns smoothly, and can be easily raised, to allow a piece of paper being placed so as to prevent sticking when not in use.

Capacity, cc.	10	25	50	100
Subdivisions, cc.	1/10	1/10	1/10	1/10
Each	**2.80**	**3.00**	**3.50**	**4.00**

1314. **BURETTE**—with **Fresenius** glass stopcock.

Capacity, cc.	10	25	25	50	50	75	100	100
Subdivisions, cc.	1/10	1/10	1/20	1/5	1/10	1/10	1/5	1/10
Each	**2.10**	**2.20**	**2.30**	**2.40**	**2.50**	**2.60**	**2.75**	**3.00**

1316. **BURETTE**—with patent three way stopcock.

Capacity, cc.	25	50	100	100
Subdivisions	1/10	1/10	1/5	1/10
Each	**3.25**	**3.50**	**3.75**	**4.00**

1318. **BURETTE—Standard,** see page 111.

1322. **BURETTE—Standard,** see page 111.

1326. **BURETTE—Schellbach,** with blue enamelled strip on white enamelled background, giving a definite meniscus; plain, for pinchcock.

Capacity, cc.	25	50	75	100	100
Subdivisions	1/10	1/10	1/10	1/5	1/10
Each	**1.70**	**2.00**	**2.50**	**2.75**	**3.00**

1328. **Ditto**—with straight Geissler stopcock.
Each **3.00** **3.50** **3.75** **4.00** **4.50**

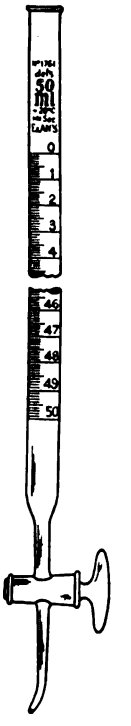
1330. **Ditto**—with patent three way stopcock.
Each **3.75** **4.25** **4.35** **4.50** **5.00**

1332. **BURETTE—Gawalowski,** side tube with stopcock to connect with reservoir for refilling.

Capacity, cc.	25	50	75	100	100
Subdivisions	1/10	1/10	1/10	1/5	1/10
Each	**4.50**	**4.75**	**5.25**	**5.50**	**6.00**

1332/1. **BURETTE—Stopcock Plugs, of silver,** used especially for titrating alkaline solutions. Advise, when ordering, size and style of Burette desired. **price on application**

1305



1318

Burettes, Standard, Precision

1305. BURETTE—Standard, for pinchcock.

These burettes are graduated in the same manner and with the same accuracy as are **1318 S. S.** (which see below). They will not be certified by the B. of S. because the Bureau's specifications call for Geissler stopcocks.

Capacity, ml.	10	25	50	100
Subdivisions	1/20	1/10	1/10	1/5
Each	**1.80**	**2.00**	**2.50**	**3.00**

1318. BURETTE—S. S., Standard.

In the manufacture of **S. S. Standard** burettes our factory follows the instructions and specifications as laid down by the Bureau of Standards as closely and as painstakingly as is possible to do so. The most modern appliances, machines and methods of calibrating, approved by the B. of S., are used. The ware in this class will qualify for a B. of S. report. We cannot, however, guarantee that every piece will receive a B. of S. certificate since the requirements of certification are so exceptionally stringent.

Capacity, ml.	25	50	100
Subdivisions	1/10	1/10	1/5
Each	**3.75**	**4.35**	**4.75**

1318/1. BURETTE—S. R., Standard.

These burettes are drawn from our stock of **S. S. Standard** burettes. They have been sent to the Bureau of Standards and have received a **Report.**

Capacity, ml.	25	50	100
Subdivisions	1/10	1/10	1/5
Each	**6.50**	**7.50**	**8.25**

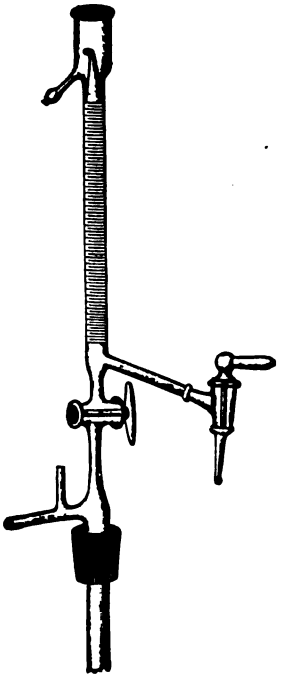
1322. BURETTE—S. C., Standard.

These burettes are drawn from our stock of **S. S. Standard** burettes. They have been sent to the Bureau of Standards and have received a **Certificate.**

Capacity, ml.	25	50	100
Subdivisions	1/10	1/10	1/5
Each	**7.50**	**8.50**	**9.25**

1334

1336


1337

1338

1342

1334. **BURETTE—Geissler, Dispensing,** with straight glass stopcock.

Capacity, cc.	100	250	500	1000	2000
Subdivisions, cc.	1	5	10	25	50
Each	**2.50**	**3.50**	**4.80**	**6.50**	**9.00**

1336. **BURETTE—Automatic,** with zero point and overflow reservoir; blue line on white enamelled back, three way stopcock, and side tube for filling from reservoir.

Capacity, cc.	25	50	100
Subdivisions	1/10	1/10	1/5
Each	**5.50**	**6.00**	**6.75**

1337. **BURETTE—Hough, improved automatic type with Zero point.** No support needed. Can be cleaned quickly, thereby possessing a great advantage over other automatic burettes as only one burette is required for a large number of standard solutions, especially solutions that are not in constant use, thus obviating a number of permanently attached burettes. Complete with clamp reservoir, rubber bulb, etc.

Capacity, cc.	25	50	100
Subdivisions	1/10	1/10	1/5
Each	**10.25**	**11.00**	**12.00**

1337/1. **BURETTE only** **5.25** **6.00** **7.00**

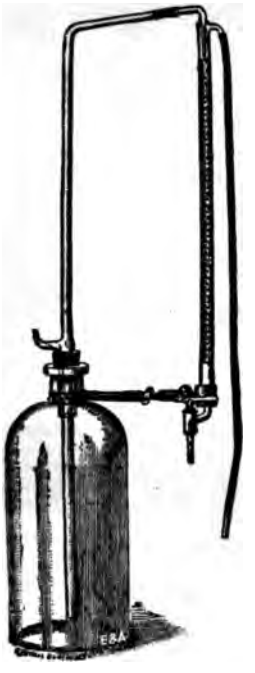
1338. **BURETTE—Knofler,** with clamp, reservoir, rubber bulb, etc.

Capacity, cc.	25	50
Subdivisions	1/10	1/10
Each	**9.25**	**9.50**

1340. **BURETTE only** **4.25** **4.50**

1342. **BURETTE—Automatic, Squibb,** filled by pressure; with blue line on white enamelled back; with reservoir.

Capacity, cc.	25	50
Subdivisions	1/10	1/10
Each	**6.60**	**7.50**



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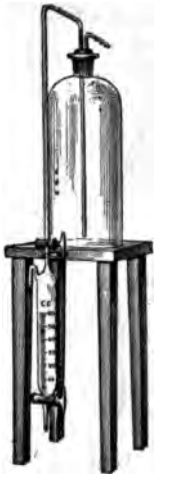

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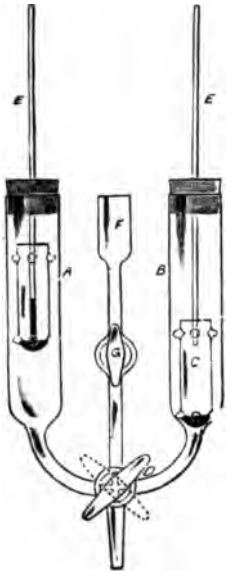


1349

1344. **BURETTE—Automatic, Squibb, latest form,** filled by pressure; with blue line on white enamelled back. Complete with clamp and reservoir.

Capacity, cc.	25	50
Subdivisions	1/10	1/10
Each	**8.25**	**8.75**

1346. **Ditto—With ground in burette,** and ground joints.

Capacity, cc.	25	50
Subdivisions	1/10	1/10
Each	**12.00**	**13.00**

1348. **BURETTE—Johnson,** for quickly measuring reagents; with burette graduated 60 cc. in single cc., 4 liter bottle, rubber bulb and pinchcock; complete on stand **12.00**

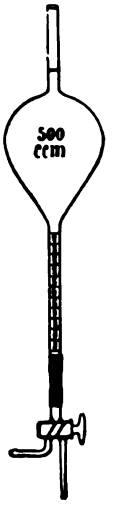
a. **BURETTE** only **8.00**

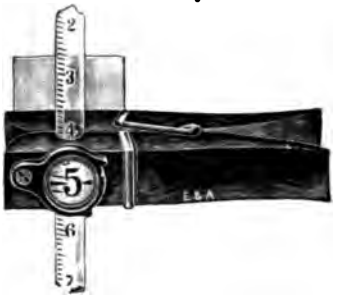
b. **STAND** only **3.50**

1349. **BURETTE—Rose, Automatic, Adjustable,** for use in laboratories where definite quantities of reagents, solvents, or precipitants are wanted repeatedly. This Burette is particularly well adapted for:

Kjeldahl Nitrogen determinations, Fibre determinations, Babcock fat determination in milk analysis, also for lead acetate solutions in sugar determinations, solvents in ore and soil laboratories, and for the measurement of nutrient solution and culture media in Bacteriological Laboratories. Supplied with measuring tubes 35 x 200 mm., giving an approximate capacity of 182 cc. each, stopcocks with 3 mm. diameter openings **15.00**

Directions for operation supplied with Burette.





1 2 3

1350 1352 1354 1356 1360 1362 1364 1366 1370

1350. BURETTE—Calibrating, Morse, for flasks, burettes, pipettes, etc. Set of three **21.00**

Part	1	2	3
Each	9.00	6.00	6.50

1352. BURETTE—Stamner, for estimation of carbonic acid in saturated gases **4.20**

1354. BURETTE—Weighing, Ripper, with arrangement for suspending by aluminum wire; graduated 60 cc. in fives **5.35**

1356. BURETTE—Attachment, glass tip, with rubber connection and pinchcock ..... **.25**

1358. BURETTE—Glass Tips, only ..... each **.05**
per dozen **.50**

BURETTE—Support, see under Support.

BURETTE—Weighing, Bailey, see No. 1155.

BURETTE—Weighing, Burkhard, see No. 1155/1.

1360. BURETTE—Cap, to protect the inside of burettes from dust .....each **.09**
per dozen **.90**

1362. BURETTE—Float, Erdmann ..... **.45**

1364. Ditto—New style, with points to prevent clinging to side of burette ..... **.65**

1366. BURETTE—Float, Beutell ..... **.55**

1368. BURETTE—Funnel, small for filling burettes ..... **.15**
See also Funnels No. 3226.

1370. BURETTE—Meniscus Reader, E. & A. improved, with magnifier, reading line, and glass plate **3.00**

BURETTES—Gas, see Gas Analysis Apparatus.

BURETTES—Milk, see Milk Testing Apparatus.

1380 1384 1386 1388

Blast Burners for Liquid Fuels

1380. **BURNER—Blast Lamp, Alcohol,** gives vertical flame; of heavy copper; small size... **3.95**

1382. **Ditto**—Large size **4.80**

1384. **BURNER—Blast Lamp, Gasoline, Barthel type,** substantial construction, very powerful. Especially suited for fusions, etc., where gas is not available, as once started it needs no further attention. Mounted on swivel, allowing the burner to be set at any angle **18.00**

1386. **BURNER—Blast Lamp, Gasoline, Turner.** The flame is adjustable from a very small one to about 5 inches in length, and will burn about 1¼ hours at full blast from one filling of the reservoir, which holds ½ pint of gasoline; of nickel plated brass. **9.60**

1388. **Ditto**—With larger reservoir; capacity 1 pint; with swivel burner and removable tripod. **14.00**

1390 1396 1398 1400

Blast Burners for Gaseous Fuels

1390. **BURNER—Blast, Bunsen,** a splendid blast burner for general laboratory work; with set of three gas nipples **6.15**

1392. **Ditto**—Same as above, with valve **for use with gasoline gas** **10.50**

1394. **Ditto—Extra large,** same form as No. 1390, very powerful **10.50**

1396. **BURNER—Blast, Wiesnegg,** mounted on ball joint; with set of three gas nipples **7.50**

1398. **BURNER—Blast, Waller,** small burner; extensively used for mineralogical purposes ... **3.95**

1400. **BURNER—Blast, Massachusetts Institute of Technology pattern.** The needle valves afford easy and accurate regulation of both the gas and air supply. Readily detachable from the stand for use as a hand blowpipe; mounted on ball socket, set of three gas nipples and two sleeves **7.90**

This is considered the best all around blast burner for general laboratory work.

1402

1406

1408

1410

1402. **BURNER—Blast, Meker.** When supplied with air at 1½ pounds per square inch, burner No. 2 gives a flame of sufficient temperature to fuse in a few minutes pure nickel wire of 1 mm. diameter. Supplied with air at 22 pounds to the square inch, the fusion of platinum is accomplished.

Size, No.	2	4
Total height of burner, inches	5⅜	7½
Each	**5.00**	**7.00**

1404. **BURNER—Blast, Meker,** same as above **with long inlet tube;** for use with furnaces, so that the rubber tubing is not subjected to the heat radiated from the furnace.

Size, No.	2	4
Total height of burner, inches	5⅜	7½
Each	**7.00**	**8.75**

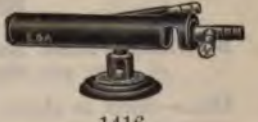
1406. **BURNER—Blast, Fletcher Compound.** Very powerful; has a great range of power from a delicately pointed jet to a brush flame. One movement adjusts both air and gas automatically **13.00**

1408. **BURNER—Blast, Fletcher,** upright blast only.

Lamp only	**3.50**
Furnace support, extra	**.60**
Blowpipe furnace with one crucible	**.25**

1410. **BURNER—Blast, Fletcher.** An automatic hand blowpipe on stand, easily detached ... **5.50**

1414


1416

1414. **BURNER—Blast. Glass Blowers fires,** for working large glass tubes.

Flames	1	2	3	4	5
Set of 2 burners	**7.90**	**12.25**	**17.50**	**22.75**	**38.50**

1416. **BURNER—Blast, Injector,** for use with gas furnaces, etc.

Size	small	large
Each	**3.00**	**4.00**

FOR OTHER BLAST BURNERS, SEE BLOW-PIPE ANALYSIS APPARATUS, PAGE 78.

1418/1

1418/2

1424

1426

1428

1430

1432

1418/1. **BURNER—Alcohol Lamp, glass,** complete with brass burner, wick and ground on cap.

Capacity, ozs.	2	4	8
Each	.30	.40	.60

1418/2. **BURNER—Alcohol Lamp** with facets, can be used in several positions. Size of wick ½ inch in diameter **1.25**

a. **Extra Burner Wicks for above** ..... **dozen** **.60**

1424. **BURNER—Alcohol Lamp, brass,** with cap, wick and wickholder.

Capacity, ozs.	2	4	8
Each	.73	.88	1.15

1426. **BURNER—Alcohol, Barthel type,** plain form **9.00**

1428. **BURNER—Alcohol Barthel,** very powerful, requires no wick; complete with 1½ meters metallic tubing and reservoir. The most satisfactory laboratory alcohol burner.

Size	small	large
Equal to; Burners	1	4
Each	13.00	16.85

1428a. **BURNER—Tripod,** extra ..... **.50** **.50**

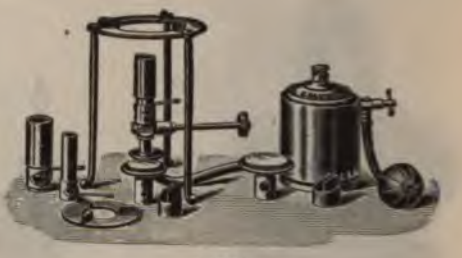
1430. **BURNER—Alcohol, Barthel type,** safe, substantial, smokeless, easily regulated, and all parts readily accessible for cleaning. Can be used with denaturized alcohol; enamelled **5.25**

1432. **Ditto**—with double burner **8.50**

BURNER—Parting Lamp, for alcohol, see Lamp No. 4206.

1436

1437



1438

1436. **BURNER—Denatured Alcohol Stove,** made of nickel plated brass. Gives a blue and intensely hot flame, readily adjustable.

Diameter at top, inches	6⅜	8
Each	**4.90**	**10.85**

1437. **BURNER—Alcohol Stove for heating,** made of brass, capacity 7 oz. **1.75**

1438. **BURNER—Gasoline, Barthel,** made entirely of brass; gives a flame that can be readily adjusted from a powerful blast of 1400° C. to a very small flame **14.50**

This is an excellent liquid gasoline laboratory Burner.

a. **Tripods** ..... **.50**
b. **Extra Burners** to give a variety of flames; for large flame **2.00**
c. **Extra Burners** to give a variety of flames; for small flame **1.00**
d. **Circular Burners,** large **2.00**
e. **Circular Burners,** small **1.50**

1440

1442

1446

1440. **BURNER—Gasoline, Barthel type,** as above, with pressure gauge and metal pump ... **15.00**

1442. **BURNER—Gasoline, Barthel type,** plain form **12.25**

1446. **BURNER—Gasoline, Cary.** The flame produced with this burner is intensely hot, clean, and gives off neither poisonous nor noxious gases.

Recommended and extensively used with furnaces, pages 275 and 276.

Inside diameter, inches	1½	1¾	2	2¼
Length, inches	13½	14	15½	17
Each	**13.25**	**14.25**	**15.75**	**17.25**

These Cary Burners are used with Tank Outfits No. 3444.

1446/1

1446/1. **BURNER—Case hydro-carbon,** inverted type. Method of operation supplied with burner.

Diameter in inches	Midget	1½	1¾	2	2¼	2½
Each	**11.00**	**14.30**	**14.40**	**17.00**	**18.70**	**20.35**

1450

1448

1454

1448. **BURNER—Gasoline, E. & A.,** for use under hot plates, etc., with connection for gasoline reservoir **4.40**

1450. **BURNER—Gasoline, Dangler Lamp,** flame easily adjustable, with tin tank **14.00**

1450/1. **Ditto**—with copper tank **16.50**

1451. The burner only for Nos. 1450 and 1450/1 ..... **4.40**

1454. **BURNER—Kerosene, Khotal Stove,** wickless, gives a blue flame, height 8¾ inches, diameter at top 8¾ inches; with support **8.60**

1454/1. **BURNER**—as above, without support **7.00**

1456

1457

1458

1459

1460

Burners for Coal, Gasoline and Natural Gas

See also Coal Gas Burners, page 121.

1456. **BURNER—Bunsen, E. & A.,** with adjustment for air and gas. The flame can be turned down to a mere speck without striking back **1.05**

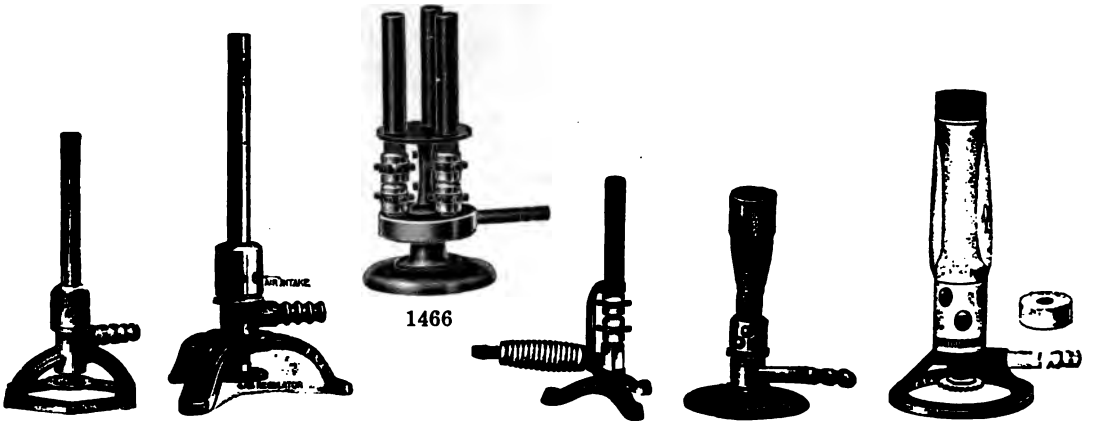
This is one of the best burners made, and very extensively used.

1457. **BURNER—Bunsen,** with adjustment for air and gas, height 7 inches **1.50**

1458. **BURNER—Fletcher, E. & A. improved,** adjustable, with regulator for air and gas ... **1.65**

1459. **BURNER**—without base, for screwing into gas pipes, with side arm stopcock, **Government pattern** **1.95**

1460. **Ditto**—without base, for screwing into gas pipes. Especially adapted for use with Kjeldahl digesting shelves, for which purpose they are extensively used **1.50**



1462 · 1463 1466 1464 1467–68–70–72 1467/1

1462. **BURNER—Tirrill,** with adjustment for air and gas; made entirely of brass **1.25**

1463. **BURNER—Detroit,** a standard burner for laboratory uses of every character. It produces a stiff blue flame of maximum temperature, without the use of air blast. Will not flash back, clog or sing **1.25**

1464. **BURNER—Bunsen, E. & A. Universal,** adjustment for air and gas; with wooden handle **1.40**

1466. **BURNER—Bunsen, Compound, with E. & A. Universal burners.**

With tubes	3	5	7
Each	**4.20**	**5.50**	**8.00**

1467. **BURNER—Meker Type, for Coal, Natural** and **Gasoline Gas;** very powerful, requiring a reasonable gas pressure for their most economical operation. The whole flame is practically a homogeneous mass of burning gas, its temperature being nearly uniform throughout.

Size No.	3	4
Height, mm.	155	190
Section of flame, mm.	24	30
Each	**3.60**	**3.50**

1467/1. **BURNER—Fisher, Meker Type,** of less expensive construction, for Coal, Natural or Gasoline Gas; produces a flame of the maximum temperature without blast or can be adjusted for a Bunsen flame by replacing the perforated nickel grid with a brass cap **1.75**

Burners, Various, for Coal Gas, Gasoline, Acetylene, or Natural Gas

1468. **BURNER—Meker,** similar to No. 1467, but for **Coal Gas.**

Size No. 1 is serviceable when a small hot flame is required. Sizes Nos. 2 and 3 are the most useful for general laboratory work. Size No. 4 will heat a platinum crucible to a temperature of 1120–1140 deg. C., while size No. 5 is used in special cases, and with furnaces.

Size No.	1	2	3	4	5
Height, mm.	115	130	155	190	250
Section of flame, mm.	16	20	24	30	42
Each	**2.10**	**2.20**	**2.65**	**3.00**	**6.60**
1470. Ditto—For Natural Gas ..... each	**2.10**	**2.20**	**2.65**	**3.00**	**6.60**
1472. Ditto—For Gasoline Gas ..... each	**2.10**	**2.20**	**2.65**	**3.00**	**6.60**

1474–78 1479 1480 1484 1494 1496

Burners, Various, for Coal Gas, Gasoline, Acetylene, or Natural Gas—Continued

1474. **BURNER—Meker, for Coal Gas,** with head to give a flat flame 50 mm. in length. Height of burner 225 mm. **7.00**

1476. **Ditto—For Natural Gas** **7.00**

1478. **Ditto—For Gasoline Gas** **7.00**

1479. **BURNER—Johnson,** for natural or artificial gas. This burner will produce a hot blast up to 2000° F. without the use of a blower. It is considered one of the most efficient natural gas burners. Complete, with air and gas regulators, and pilot flame; with support for vessels, as illustrated **7.35**

1480. **BURNER—Teclu,** producing a very high temperature; with adjustment for gas and air; height 7½ inches, diameter of tube ¾ inch **4.40**

1482. **Ditto—Small,** height 6 inches **3.10**

1484. **BURNER—Bunsen, Manhattan, for Acetylene.** A regular size Bunsen which produces a very hot flame. With attachment as illustrated **3.10**

1486. **Ditto**—without attachment **2.90**

BURNER—Fletcher Boiling, etc., for gasoline gas—see page 124.

Bunsen Burners

For Coal Gas

1494. **BURNER—Bunsen,** with air regulator and slot shaped nipple, so that the opening can easily be adjusted as required ..... each **.45**
dozen **4.80**

A substantial burner and very satisfactory for ordinary use.

1500

1496. **Ditto**—With stopcock on gas supply tube **1.75**

1498. **Ditto**—Large size, with air regulator, 5 inches high, bore of tube ½ inch; without stopcock ..... **.65**

1500. **BURNER—Bunsen,** with stopcock but without base; fitted with male thread to screw into a pipe **1.00**

1502. **Ditto**—Without stopcock ..... **.80**

1504

1506

1508

1510

1504. **BURNER—Bunsen, low form, improved construction;** with air regulator ..... **.60**

1506. **BURNER—Bunsen,** micro, nickel plated, 2 inches high, tube ¼ inch in diameter ..... **.70**

1508. **BURNER—Bunsen, Page new form (Patented).** This is a very satisfactory inexpensive burner of simple construction. Made in three parts; the air supply is adjustable by sliding the tube, which cannot stick or clog ..... **.35**

1510. **BURNER—Bunsen, Wynne form,** adjustable on horizontal axis. Very powerful; can be used in place of a blast lamp **2.25**

1512

1514

1522

1512. **BURNER—Bunsen, Wynne form,** with adjustable extension arm **3.50**

1514. **BURNER—Bunsen, Fletcher Safety,** can be turned down to a mere flicker without striking back. Made of brass with gauze top, which is easily replaced; without base.

Size	small	medium	large
Diam. of gauze across top, in.	⅞	1¼	1½
Each	**2.00**	**2.40**	**3.00**

1516. **Ditto**—With base **2.90** **3.40** **4.10**

1522. **BURNER—Chaddock (Patented).** This burner, which is incorrodable, being made of porcelain and white fireclay, is of special value in hoods where metal burners soon corrode. It is also very desirable for general laboratory purposes, as it dispenses with the use of retort stands and wire triangles; with flame spreader, asbestos disc, asbestos rings, and small chimney for platinum triangles **4.00**

Separate Parts

a. Lower Burner ..... each **2.25**
b. Castle top (chimney) ..... each **.50**
c. Triangle holder (Clay ring) ..... each **.20**
d. Asbestos disc 4½″ diam. ⅛″ thick ..... dozen **150**
e. " " 4½″ " ⅛″ " composed of two rings cemented together with hole 2″ in diameter ..... dozen **2.40**
f. Asbestos disc 4½″ diam. ⅛″ thick with 2½″ hole ..... dozen **1.20**

1524

1526

1528

1534

1536

1538

1524. **BURNER—Pilot flame,** with stopcock **2.50**

1526. **BURNER—Pilot flame, E. & A. form,** with stopcock **3.00**

1528. **BURNER—Argand, low form,** adjustable flame, for **artificial or natural gas,** with **brass** tip, and mica chimney **1.10**

1528a. **Extra mica chimney** ..... **.35**

1530. **BURNER** like 1528 but with glass chimney **1.20**

1530a. **Extra glass chimney** ..... **.35**

1532. **BURNER** like 1528 but with copper chimney **1.25**

1532a. **Extra copper chimney** ..... **.40**

1533. **BURNER** like 1528 but with iron chimney **1.15**

1533a. **Extra iron chimney** ..... **.25**

1533/1. **BURNER** like 1528 but without base and chimney ..... **.70**

1534. **BURNER—Illuminating,** for bending glass, etc., or for table illumination; height 15 inches **2.00**

1536. **BURNER—Ring, Rogers,** for heating platinum crucibles, etc.; complete as illustrated without platinum triangle **18.00**

1538. **BURNER—Braun,** for operating with coal or natural gas. A blower of about 1/6 H. P. is necessary to supply a sufficient amount of air for this burner. The best results are obtained from ¾ in. gas supply pipe; complete, including air and gas valves. Used with furnaces, see page 275, etc. **20.75**

1540

1544

1546

1540. **BURNER—Bunsen,** set of four in line, without stopcocks **4.50**

1542. Ditto—Each with stopcock **9.00**

1544. **BURNER—Bunsen,** set of four in line, each with stopcock and wing burner; complete with adjustable support, and trough for heating tubes **14.00**

1546. **BURNER—Meker,** No. 3, **for coal gas;** set of four mounted on a tube, for use with furnaces **18.50**

1548. **Ditto—For natural Gas** **18.50**

1548/1. **Ditto—For gasoline Gas** **18.50**

1549

1549/4

1550

1552

1549 **BURNER—Hawks, high power gas.** Used **singly** or in **clusters** for a wide variety of purposes in laboratories and factories. The Burner that won't flash back.

Total height, inches	4¼
Diameter, cap	2½
No. flame parts	18
Cap. cu. ft. per hr.	2–25
Each	**2.00**

1549/4. **Ditto—cluster of four burners,** mounted on stand, complete.

Total height, inches	10¾
Each	**13.50**

1550. **BURNER—Ring form,** with air regulator; to attach to support.

Diameter, inches	3	4	5	6
Each	**1.75**	**1.95**	**2.20**	**2.65**

1552. **Ditto**—with stopcock.

Diameter, inches	3	4	5	6
Each	**2.75**	**3.00**	**3.25**	**3.70**

1554

1558

1562

Any of the following Fletcher Burners can be fitted with suitable attachments for use with gasoline gas at an extra charge.

1554. **BURNER—Fletcher Argand,** with tripod.

Size, inches	⅜	½	¾
Each	**1.00**	**1.25**	**1.50**

1556. **Ditto—Without tripod** ..... each **.75** **1.00** **1.25**

1558. **BURNER—Fletcher Boiling,** solid flame; very convenient to heat large vessels. Small size, diameter 3½ inches **2.50**

1558a. **Extra perforated caps** ..... **.45**

1560. **BURNER—Fletcher,** Large size, diameter 4½ inches **3.25**

1560a. **Extra perforated caps** ..... **.55**

1562. **BURNER—Fletcher, Evaporating,** of solid copper.

Diameter, inches	4	5	6½	7¾
Each	**2.50**	**3.00**	**3.75**	**4.50**

1564. **Ditto**—Of cast iron ..... each **1.75** **2.00** **3.00** **3.75**

1 2 3

1565

1566

2¾ and 4" size

1570

6" size

1570

1565. **BURNER—Friedburg improved, Bunsen Flame;** draws its air supply from the top; flame can be turned very low, without danger of flashing back; air supply is regulated by sliding telescopic tube; a hotter flame is obtained with less consumption of gas; suitable for either gas or gasoline gas.

No. 1 Hinged for tilting	**1.00**
No. 2 Hinged for tilting on stationary support	**1.50**
No. 3 Hinged for tilting on tilting support	**1.50**
No. 4 Stationary support	**1.20**
No. 5 Blowpipe attachment	**.60**

1566. **BURNER—Fletcher Radial.** No. 1R, burner ring, 3¾ inches diameter **2.50**

1568. **Ditto**—No. 2R, burner ring, 5 inches diameter **3.25**

1570. **BURNER—Fletcher High Power,** very powerful.

Diameter, inches	2¾	4	6
Each	**4.50**	**7.00**	**10.50**

1572

1574

1572. **BURNER—Low Shape,** extra large with gauze top; height 5 inches, diameter 2¼ inches, extreme length, 14 inches **2.90**

1574. **BURNER—Fletcher New Laboratory,** with support for vessels; and sandbath. Vessels can be placed at different heights above the flame, which can be turned down very low.

Support for flask, diam. in.	4¼	7	8
Support for flat vessels, diam. in.	6½	9	11
Sandbath, diam. in	9	13	15
Complete	**3.10**	**5.85**	**9.25**

1578

1576

1580

1576. **BURNER—Fletcher,** for low and high temperatures. This burner gives a complete range of temperature from a gentle current of warm air to a clear red heat. For low temperatures, the ring must be lighted through the opening B; with blast pipe C **2.00**

1578. **BURNER—Economy Stove,** with one set of burners, 9¾ inches square on top **8.25**

1580. **BURNER—Vulcan Stove,** black finish, nickel legs.

Size of plate, inches	11⅝x16	21⅝x16	31⅝x16
Number of burners	1	2	3
Each	**6.50**	**9.00**	**12.00**

1582

1584A

1586

1590

1582. **BURNER—Fletcher,** solid flame, very efficient **3.25**

1582a. **Extra perforated caps** ..... **.35**

Burner—Hot Plates, see Hot Plates.

Burner Attachments

1584. **BURNER—Attachment only,** for triangles, dishes, etc., inside diameter 3 inches ..... **.75**

1584a. **Ditto**—with burner as per illustration **2.25**

1586. **BURNER—Chimney,** of Russian iron, small; diameter at bottom 2 inches ..... **.20**

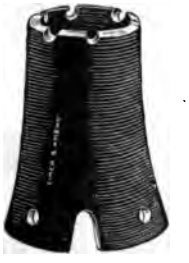
1588. **Ditto**—large, diameter at bottom, 2⅝ in. ..... **.25**

1590. **BURNER—Chimney,** of Russian iron, with support attached; to fit tubes ⅜ inch diameter ..... **.50**

1592

1594

1596

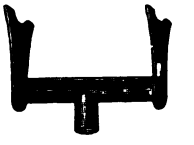

1598

1600

1602

1608

1610


1614

1616

1592. BURNER—Tube, for blow-piping; to set on top of Bunsen burners ..... .15

1594. BURNER—Tube, for blow-piping, fitting inside the tube of Bunsen burner ..... .20

1596. BURNER—Fork, for attaching burner to support ..... .30

1598. BURNER—Guard, of vitrified earthenware. Very useful for protecting the flame from drafts; makes a rigid and convenient support. Height 9 inches, diameter at bottom, 8 inches, diameter at top, 5 inches ..... .50

1600. BURNER—Crown (rose top), to fit any of our regular burners ..... .50

1602. BURNER—Gauze top, giving a large round flame, to fit 7/16″ burner ..... .28

1602/1. BURNER—Gauze top, giving a large round flame, to fit ½″ burner ..... .30

1604. BURNER—Plate, of iron; for expanding Bunsen flame ..... .35

1608. BURNER—Star support, for chimney, to fit 7/16″ burner ..... .30

1608/1. BURNER—Star support, for chimney, to fit ½″ burner ..... .30

1610. BURNER—Tripod, for supporting dishes, etc., to fit 7/16″ burner ..... .20

1612. Ditto—large, for ½″ tube ..... .25

1614. BURNER—Tube Support, to take tubes up to 1 inch diameter. Made to fit our regular burners 1.00

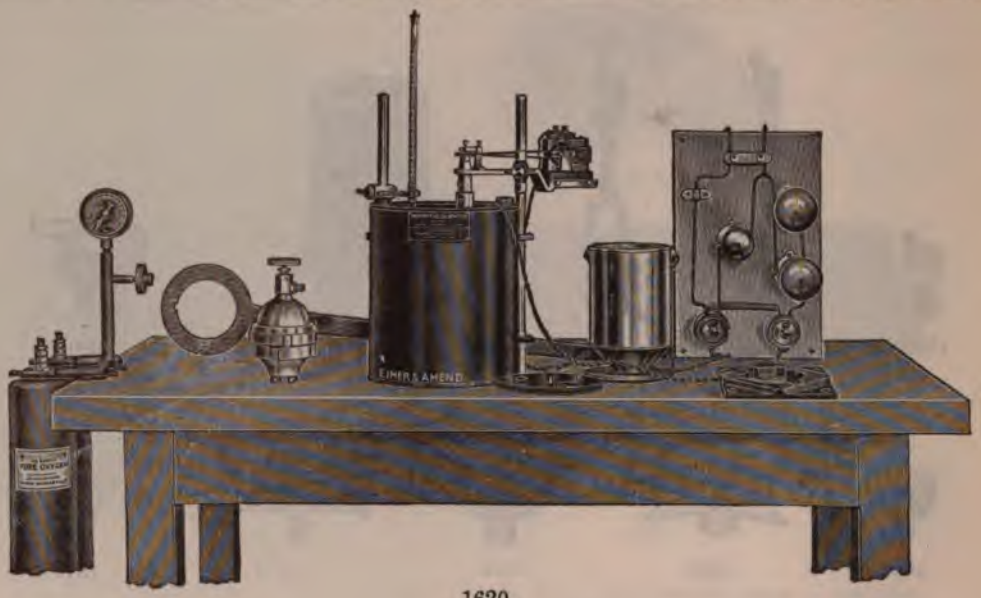
1616. BURNER—Wingtop, for bending glass tubes, to fit 7/16″ Bunsen burner ..... .12

1616/1. Ditto—Wingtop, for bending glass tubes, to fit ½″ Bunsen burner ..... .15

CALCIUM CHLORIDE TUBES—see Tubes.

CALCIUM CHLORIDE JARS—see Jars.

CALIPERS—see Measures.



1620

Calorimeters

For determining accurately the amount of heat generated during a combustion. Used especially for fuels, —solid, liquid or gaseous,—but used also in research work for determining the heating value of foods, etc.

Calorimeters, Oxygen Bomb

Standard instruments for determining the heating value of solid and liquid fuels. Used also for research work on the heating value of foods, etc.

1620. **CALORIMETER—Emerson oxygen bomb,** Single Valve type. The Emerson is the most popular calorimeter. **Over 1000 are in use** in this country. It is easy to operate. Repair parts are quickly and economically secured. The bomb of carbon steel is very accessible. It consists of two cups joined by means of a heavy steel nut permitting quick inspection and thorough cleaning.

The outfit includes the bomb with spun nickel lining (easily replaceable at small cost), double walled calorimeter jacket, piping with high pressure gauge for oxygen tank. (Be sure to specify whether S. S. White or Linde Co. oxygen tanks are used. Piping is double for S. S. White tanks and single for Linde tanks), special holder and spanner, stirrer with motor mounted on separate shaft, nickel fuel pan, thermometer holder, gasket, etc. **245.00**

The water equivalent factor is supplied with each outfit.

1621. **Ditto—with Monel Metal bomb** **280.00**

1622. **Ditto—with gold lined (not plated) bomb** **280.00**

1624. **Ditto—with platinum lined bomb** ..... **price on application**

Note—Above outfits do not include thermometer, oxygen tanks, table, nor switchboard as shown in cut.

Thermometers for Emerson Calorimeters

THERMOMETERS—Standard, range about 12° C., subdivided into 1/50° C., without Bureau of Standards certificate, see No. 6848.

Ditto—with certificate, see No. 6850.

Ditto—graduated into 1/100° C., without certificate, see No. 6852.

THERMOMETER—Same as 1630, but with Bureau of Standards certificate, see No. 6854.

THERMOMETER—Beckman Differential range of about 5° C., subdivided into 1/100° C., without Bureau of Standards certificate, see No. 6804.

Ditto—with certificate, see No. 6806.

THERMOMETER—Beckman Differential, with auxiliary scale, which permits of easier adjustment; without B. of S. certificate, see No. 6816.

Ditto—with certificate, see No. 6816/1.

Thermometer for Daniels Adiabatic Jacket, see page 131.

No. 1620. **Continued.**

Note—We do not handle Oxygen gas. This should be ordered direct from S. S. White Dental Mfg. Co., Prince's Bay, Staten Island, N. Y., or from the Linde Air Products Co., Niagara Falls, N. Y. The tanks sold by the S. S. White Co. are rather small and two tanks are ordinarily connected to the Calorimeter. The tanks of the Linde Co. are larger and but one tank is used. Please note that *special* calorimeter fittings are required in each case. Therefore, with your order, make of oxygen you intend to use must be specified.

The switch shown in cut will be supplied from our work shop if desired, but can usually be made up more economically by your own electrician. By changing the arrangement of lamps on the switchboard the small *motor* can be made to operate on any ordinary current. The same applies to the electric ignition.

SPECIAL MOTOR for battery drive, extra **7.50**

For Coal Crushers and Grinders, see Crushers.

For full details of operation including sampling, taking the run, standardization, additional apparatus needed, etc., see special bulletin No. 200.

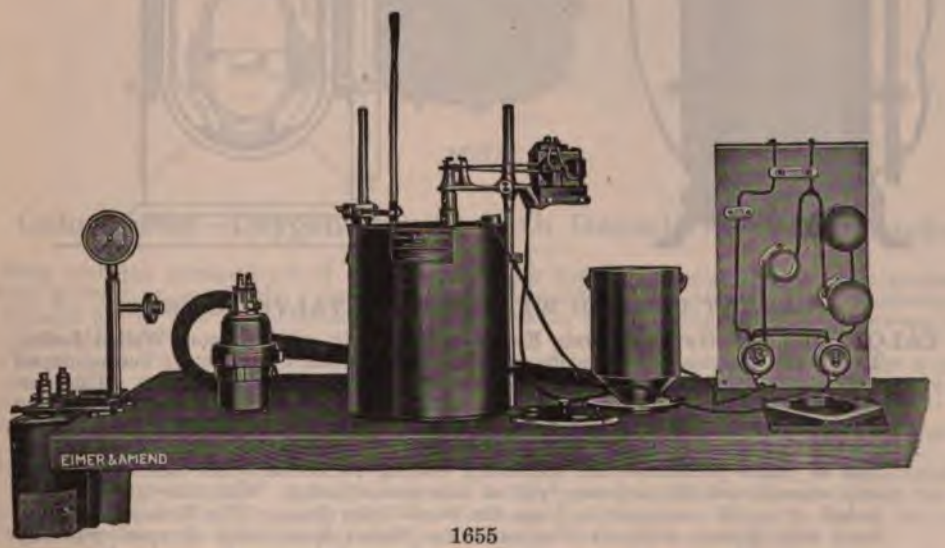
1643. **BOMB—nickel lined, single valve,** with interior nickel fittings **105.00**

1643/1. **BOMB—monel metal, single valve,** with interior nickel fittings **140.00**

1644. **BOMB—gold rolled copper lining, single valve,** with interior nickel fittings **220.00**

The Gold lined bomb is recommended for the highest type of work. It is an admirable substitute for the platinum lined bomb.

For accessories, see page 132.



1655

1655. **CALORIMETER—Emerson, oxygen bomb, double valve type,** suitable for determining accurately the amount of heat generated in combustions; also for the determination of the sulfur content of combustibles.

It is used for this work in the same manner as the standard single valve bomb outfit No. 1620.

In addition to above use, however, the double valve bomb offers the opportunity of determining quantitatively the amount of the various products of combustion. This is done by passing a current of dry purified air through the bomb and on through a train of bulbs where the various products are absorbed, with proportionate increase in the weight of the bulbs.

The double valve bomb is cylindrical in shape, capacity 500 cc.

Outfit complete as described under No. 1620, but with double valve nickel lined bomb. **255.00**

1655/1. **Ditto**—with **monel metal** bomb ..... **price on application**

1656. **Ditto—with bomb fitted with gold rolled copper lining and nickel interior fittings.** **385.00**

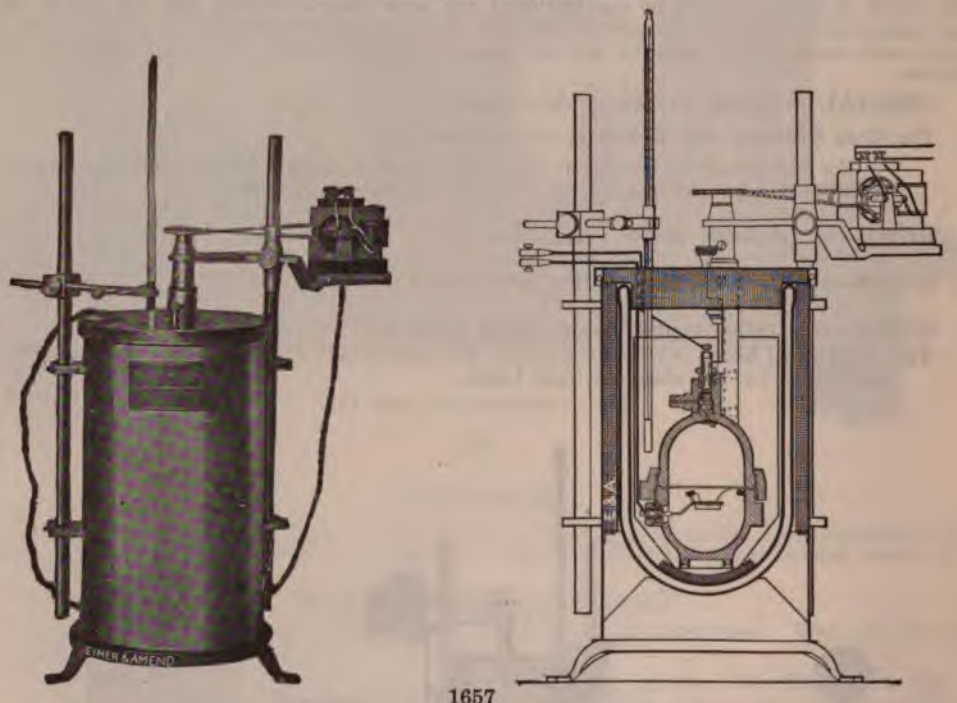
Please note that the double valve bomb cannot be used with outfit No. 1620, also not with the vacuum cup outfit. For further details see bulletin No. 200.

1655A. **DOUBLE VALVE BOMB** only, with **nickel** lining and other interior fittings of nickel **120.00**

1655B. **DOUBLE VALVE BOMB** only, of **Monel** metal, other interior fittings of nickel.... **price on application**

1656A. **DOUBLE VALVE BOMB** only, with **gold rolled copper** lining, other interior fittings of nickel **250.00**

For accessories, see page 132.



1657

CANNOT BE USED WITH DOUBLE VALVE BOMB.

1657. **CALORIMETER—Oxygen Bomb, Emerson Adiabatic,** with Vacuum Walled Jacket. This outfit comprises the widely used Emerson Bomb Calorimeter, but equipped with a new design of insulating jacket containing a vacuum walled cup. This provides an almost perfect heat insulating medium so that the heat reaction is carried out under practically adiabatic conditions, i.e., under conditions where no appreciable amount of heat is lost from or added to the calorimeter water. Further, this type of jacket eliminates the customary cooling correction which has to be taken into account with the ordinary type of calorimeter jacket. With this new design of jacket, it is not necessary to hang the bomb from above. The Emerson Bomb is lined with Nickel, Gold, or Platinum—the Nickel lined outfit is most generally employed. The nickel lining will, if carefully used, last for hundreds of determinations, and it can readily be replaced by the operator at small expense. For additional details, see Bulletin No. 200.

Outfit comprising nickel lined bomb (single valve) with internal fittings, double or single oxygen piping with gauge, insulating jacket with vacuum walled cup, calorimeter bucket, stirrer with motor, thermometer holder, etc., complete, without thermometer **285.00**

1657/1. **Ditto—with gold lined bomb** **405.00**

For thermometer, Oxygen, etc., see pages 128-129. For other accessories, see page 132.

1657/2. Owners of the regular single valve Emerson outfit wishing to use the above jacket with vacuum walled cup can purchase that part of the adiabatic outfit with the necessary accessories. The equipment comprises the felt-lined copper jacket with cast iron base, vacuum walled interior cup, calorimeter bucket, special top for jacket and posts for mounting stirrer, etc. **75.00**

The latest design of stirrer (No. 1658/77), mounted on separate shaft, must be used with adiabatic outfit. If the original outfit includes the old design stirrer, i.e., the one in which the paddle wheel shaft has an under-water bearing at the lower end of the stirrer tube, the latest design of stirrer should be purchased.

For Single Valve Bombs, Thermometers, etc., see pages 128, 129, and 132.

1657/4

Calorimeter—Oxygen Bomb, with Daniels Adiabatic Jacket

Along with the increased use of the calorimeter for both commercial and scientific purposes there has been growing up constantly a demand for improvements in the design of the calorimeter jacket. This demand has in view the elimination as far as possible of the exchange of heat between the calorimeter and the calorimeter jacket.

This is desired in order to obtain increased accuracy in calorimeter work; also so that a calometric test can be made under adiabatic conditions, obviating the necessity of making the cooling correction, and therefore of taking the thermometer readings which supply the data for this correction.

A Vacuum walled jacket when **operated approximately at room temperature** gives satisfactory adiabatic conditions for commercial work. This type of jacket, however, is somewhat fragile.

In previous designs the jacket water suitably stirred has been heated by coils. In the Daniels Jacket, however, the jacket water itself is the heating unit and by passing an electric current through the same its temperature is raised simultaneously with the calorimeter temperature. Thus the lag of the resistance wires of the heating coils is eliminated, also the stirring, as the heat is not localized.

1657/4. CALORIMETER—as above, single valve bomb, complete with nickel lined bomb and Daniels Adiabatic jacket, not including thermometers, for A. C. current **285.00**

1657/4. Ditto—with double valve bomb, nickel lined, for A. C. current **295.00**

1657/6. GOLD LINED OUTFIT as above, single valve bomb, for A. C. current **405.00**

1657/7. " " " " " double valve bomb, for A. C. current **425.00**

Daniels Adiabatic Jacket is adapted only for A. C. current. If current is D. C. Rotary Converter must be ordered in addition.

1657/8. ROTARY CONVERTER—for converting D. C. into A. C. current **65.00**

1657/9. SPECIAL THERMOMETER—for Daniels adiabatic jacket, grad. in 1/10° range from 15° to 35° C. **5.50**

For other calorimeter thermometers, see page 128.

For single and for double valve bombs, see pages 129 and 130.

For accessories, see page 132.

For additional details, see Bulletin No. 200.

Accessories for Emerson Calorimeters

		Price
1658/1.	Steel upper cup for single valve bomb	24.00
2.	Steel lower cup for single valve bomb	38.00
3.	Steel nut for either single or double valve bomb	24.00
4.	Nickel lining, complete for single valve bomb	12.00
5.	Upper cup of nickel lining, single valve bomb	6.00
6.	Lower cup of nickel lining, single valve bomb	6.00
7.	Old style lower nickel cup, nickel lining with 5/8" hole at bottom	6.00
8.	Gold rolled copper lining, complete for single valve bomb	120.00
9.	Upper cup, gold rolled copper lining for single valve bomb	60.00
10.	Lower cup, gold rolled copper lining for single valve bomb	60.00
11.	Steel upper cup for double valve bomb	24.00
12.	Steel lower cup for double valve bomb	40.00
13.	Nickel lining, complete for double valve bomb	12.00
14.	Upper cup, nickel lining, for double valve bomb	6.00
15.	Lower cup, nickel lining, for double valve bomb	6.00
16.	Gold rolled copper lining, complete, for double valve bomb	140.00
17.	Upper cup, gold rolled copper lining, for double valve bomb	55.00
18.	Lower cup, gold rolled copper lining, for double valve bomb	85.00
19.	Binding post, nickel	1.50
20.	Bushing, vulcanite, for stirring device	1.75
21.	Bucket, regular, for single valve calorimeter	4.40
22.	Wood Support for bucket	2.60
23.	Bucket, regular, for double valve bomb calorimeter	4.50
24.	Bucket, for vacuum walled jacket	6.00
25.	Complete set of wire leads for firing circuit	2.50
26.	Connection for leads to valve spindle	.35
27.	Connection for wire leads, circuit end	.45
28.	Binding screws for circuit and connections	.30
29.	Connection for wire leads to insulation plug	.40
30.	Deflector, nickel, for single valve bomb	.25
31.	Deflector, nickel, for double valve bomb	.25
32.	Deflector Screw, nickel, for either single or double valve bomb	.35
33.	Fork, for nickel taper pin on fuel pan support	.35
34.	Fuel Pan, nickel, regular	.60
35.	Fuel Pan Support, nickel, regular	2.40
36.	Fuel Pan Support, nickel, old style for bottom connection	2.40
37.	Nut, nickel, for Fuel Pan Support	.35
38.	Taper Pin, nickel, for Fuel Pan Support	.40
1658/39.	Gaskets, lead, 3 1/16" dia...per doz.	1.80
40.	Gaskets, lead, for valve, 1/2" inside diameter ..... per doz.	.75
41.	Gaskets, lead, between oxygen piping and oxygen cylinder, 1/4" inside diameter .....per doz.	.55
42.	Gaskets, lead, for insulation plug, 5/8" inside diameter ....per doz.	.75
43.	Gaskets, leather, 1/8" inside diameter, used between bomb and oxygen piping .....per doz.	.55
44.	Gauge, pressure, for oxygen piping	10.00
45.	Insulation Plug	4.40
46.	Insulation Plug, for old style bomb, plug at bottom of bomb	4.50
47.	Jacket, regular calorimeter, with posts, cover calorimeter bucket and wood standard	45.00
48.	Cover for regular jacket	4.00
49.	Jacket, Daniels Adiabatic, with jacket cover, posts, bucket, felt covering, wood standard, etc.	75.00
50.	Cover, Daniels Adiabatic Jacket.	6.00
51.	Jacket, Vacuum Walled Adiabatic, with jacket cover, bucket, posts, vacuum wall flask, etc.	75.00
52.	Cover, Vacuum Walled Jacket	5.00
53.	Cast iron base for Vacuum Walled Jacket	4.00
54.	Vacuum Walled Flask for Vacuum Walled Jacket	12.00
55.	Legs for bomb, vulcanite, with screws, 20¢ each, 4 for	.80
56.	Motor for Stirrer (old style)	7.50
57.	Motor for Stirrer (new style)	7.50
	Motor Parts.	
58.	Armature for No. 36 Motor	4.25
59.	Armature for No. 36-A Motor	3.50
60.	Brushes for No. 36 Motor, per pair	.40
61.	Brushes for No. 36-A Motor, per pair	.60
62.	Field for No. 36 Motor	2.50
63.	Field for No. 36-A Motor	2.50
64.	Fibre Base for No. 36 Motor	1.10
65.	Oxygen Piping, including gauge, for single valve bomb to fit S. S White Cylinders	40.00
66.	Oxygen Piping, including gauge, for double valve bomb to fit S. S. White Cylinders	40.00
67.	Oxygen Piping, including gauge, for single valve bomb to fit Linde Cylinders	40.00
68.	Oxygen Piping, including gauge, for double valve bomb to fit Linde Cylinders	40.00
69.	Oxygen Piping Set Screws for S. S. White Oxygen Piping	.20
70.	Oxygen Piping Plug. Blank, for S. S. White Oxygen Piping	.55
71.	Plate Holder, cast iron	7.00
72.	Posts, for calorimeter jacket, per pair	2.75
73.	Sliding Base for Motor, dovetailed	2.00
74.	Thumb Screws for stirring device bracket	.35
75.	Sliding Base Thumb Screws	.35

Accessories for Emerson Calorimeters, Continued.

1658/76.	Stirrer Belt	1.00
77.	Stirring Device (new style), complete with motor	34.00
78.	Thermometer Clamp and Holder, complete	7.25
79.	Thermometer Clamp Holder, only	4.75
80.	Thermometer Clamp Holder, with screws only	2.60
81.	Thermometer Clamp Holder Screws	.35
82.	Thermometer Telescope, regular.	4.00
83.	Valve to Bomb, complete, except hand wheel	5.50
84.	Valve Body	2.00
85.	Valve Packing Nut	.85
86.	Valve Nipple	1.00
87.	Valve Spindle	1.85
88.	Valve Handle	1.30
89.	Valve Seat	.35
90.	Bomb Nipple with valve seat for double valve bomb	1.65
91.	Wrench, for tightening bomb, 30 inch handle	14.00
92.	Wire, Iron Fuse, .004" diameter, per spool	.60

1663

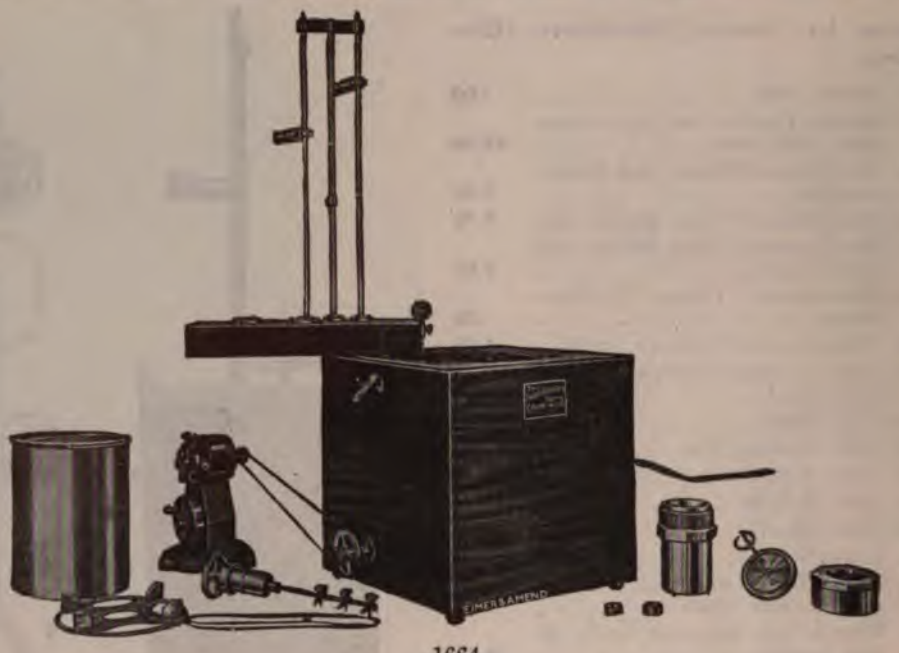
1663. **CALORIMETER—Oxygen Bomb, Parr.** The advantages of this Calorimeter compared with the older types of Mahler, etc., are found in the material of the bomb itself, and the ingenious device which forms the oxygen inlet. The bomb is made of an acid resisting alloy (Illium), superior in strength to the best tool steel; it is unlined. It has been brought to such a high degree of perfection that the apparatus is an equivalent of the platinum lined outfits, even to the most exacting degree of refinement. Other special appliances such as the method of holding and closing the bomb, connecting with the oxygen supply and charging the same, the device for stirring which is of the revolving instead of the up-and-down type, etc., has resulted in a practical revolution in speed and convenience of operation. To be used with Linde Company oxygen tank.

OUTFIT AS ABOVE, complete with bomb, water container, insulating vessel with cover, stirrer and pulley, oxygen connection with gauge, needle valve and couplings, one-half dozen capsules of special alloy, reading lens, ring support for holding calorimeter covers, special ignition wire and gaskets 300.00

1663A.	Bomb only	225.00
1663C.	Insulating Vessel with cover, stirrer and pulley	30.00
1663D.	Oxygen Connection with gauge, needle valve and couplings	26.00
1663E.	Octagon Holder for Bomb, with spanner wrench	10.00
1663F.	Electric Motor, E. & A. Universal, with variable speed, direct or alternating	30.00
1663G.	Capsule (special alloy)	3.50
1663H.	Thermometer graduated 65–90° in 1/20° F. with U. S. Bureau of Standards Certificate	12.00
1663J.	Reading Lens	2.50
1663K.	Ring Support for holding thermometer	2.00
1663L.	Special Ignition Wire ..... per card	.75
1663M.	Large Gaskets for bomb ..... per dozen	.90
1663N.	Small Gaskets for valve ..... per dozen	.90
1663P.	Small Gaskets for union ..... per dozen	.25
1663S.	Ring Support for holding bomb cap while adjusting fuse wire, fuel capsule, etc.	2.00

For Beckmann Calorimeter Thermometers, see Nos. 6804–6816.

FOR FURTHER DETAILS, SEE BULLETIN NO. 200.



1664

1664. **CALORIMETER—Oxygen Bomb, Parr, Adiabatic.** This Calorimeter has two special features. The bomb is made of the new acid resisting alloy (Illium). This gives a bomb in every way as satisfactory for use as one platinum or porcelain lined. The Illium bomb has the advantage that it does not crack nor chip, and there is no danger of rust underneath the lining, as may occur with a platinum or other lined bomb.

A new adiabatic system is employed. Water is kept circulating constantly through the cover and on all sides of the jacket. By turning the proper valve, colder or warmer water is admitted and immediately distributed throughout the jacket. Thus the operator is enabled to control at all times the temperature of the jacket water, and to make it correspond with that of the calorimeter can.

Thus errors due to radiation or conductivity lag are eliminated and the use of calculations for radiation are made unnecessary. The Calorimeter cover is pivoted so that it swings out of the way in a horizontal direction, carrying the thermometer with it, and reducing the danger of breakage.

Complete with Illium Bomb, water container, adiabatic water jacket, stirrer and pulley, oxygen connection with gauge, needle valve and couplings, 6 capsules of Illium metal, reading lens and support, special ignition wire and gaskets, but without motor, thermometer, heater or heater burner **400.00**

Accessories

1664A. **Heater for water supply system** **25.00**

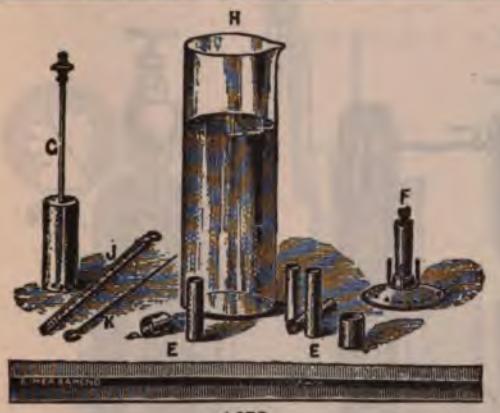
1664B. **Heater Burner** **1.00**

All other parts, see No. 1663, Parr Oxygen Calorimeter.

1672. **CALORIMETER—Oxygen Bomb, Atwater.** This is a modification of the well known Mahler Bomb. Outfit consists of steel bomb, with platinum top and rolled platinum plated lining, clamp for holding bomb, support for bomb whilst charging, pellet press and mould, calorimeter cylinder with water holder, stirrer and motor, mounted receptacles for lamp resistance with switch, special design thermometer reading lens, washers, spanners, etc ..... **price on application**

1674. **Ditto—with gold plated bomb** ..... **price on application**

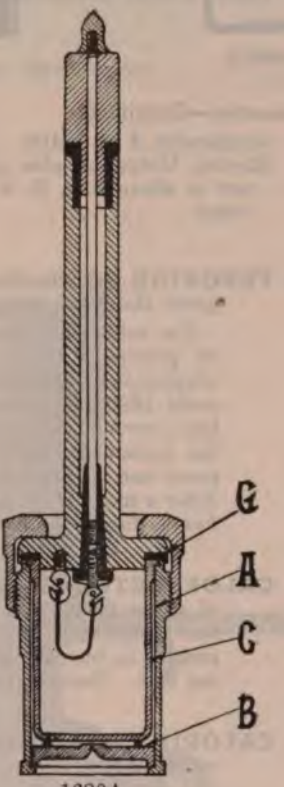
For Pellet Press, see No. 5572.



1678

1678. COLORIMETER—Thompson, for determining the relative commercial values of fuels, consisting of combustion cylinder, with separate spring clutch, base, 6 cylindrical copper cylinders, 2 short ditto, graduated glass water cylinder, fine thermometer in 1/10° C., hand scales with gram or grain weights, iron pestle and mortar, package of oxygen mixture, etc. Complete in 2 cases, with instructions for use ... **75.00**

1680



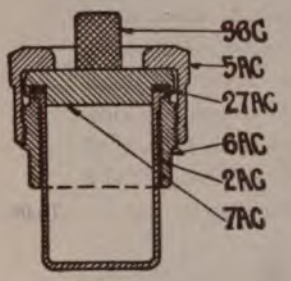
1680A

1680. CALORIMETER—Peroxide Bomb, Parr, consisting of the calorimeter proper, thermometer in 1/20 F. with Bureau of Standards Certificate, a 2000 cc. graduated flask, measuring cup 5 inch, 100 mesh brass sieve with bottom, reading lens, camel hair brush, and chemicals for 50 determinations. For electrical ignition **100.00**

For additional information, write for bulletin No. 200.

Accessories

1680A.	Bomb only with wrenches	**40.00**	**1680L.**	Gaskets .....per dozen	**.40**
1680B.	Special Alloy Cups	**6.25**	**1680M.**	Thermometer, 65–90 Deg. F. in 1/20, with certificate	**12.00**
1680C.	Cup Covers Complete	**1.10**	**1680N.**	Thermometer, 65–105 Deg. F. in 1/20, with certificate	**15.00**
1680D.	Two Liter Can	**5.65**	**1680O.**	Sodium Peroxide ½ lb. can, special grade	**1.50**
1680E.	Deflector	**4.70**	**1680P.**	Sodium Peroxide, ¼ lb. can, special grade	**.95**
1680F.	Measuring Cup	**.95**	**1680R.**	Sodium Peroxide, 1 lb. can, special grade	**2.25**
1680G.	2000 cc. Measuring Flask	**3.00**			
1680H.	Brass Sieve, 5 inch, 100 mesh, with bottom	**3.50**			
1680I.	Reading Lens	**2.50**			
1680K.	Ignition Wire, ...per card	**.75**			



1680/5

1681

1683

Accessories—Continued.

1680S. Accelerator, 2 oz. bottle **1.00**

1680T. Electric Motor, variable speed, direct or alternating, E. & A. Universal **30.00**

1680/5. **PEROXIDE BOMB—Parr,** new sulfur bomb for Organic and Inorganic Sulfur and Organic Halogens, designed to replace the Carius Method **25.00**

For sulfur determinations which are to be made independently of the calorimetric process, a special apparatus, as shown in Illustration, has been devised. An adaptation has been made of the same fusion cup as that in the calorimeter used with outfit 1680. By reference to cut 1680/5 it will be seen that the fusion cup (2AC) has a cover (7AC) with a gasket (27AC) and a screw cap (5AC), by means of which the container is tightly sealed. The lower half of the fusion cup, however, is exposed and by applying heat to the bottom of the cup, the charge is readily ignited. After a moment, it is held under tap for cooling, the cup is then removed, and the fusion dissolved out.

1681. **CALORIMETER—Steam, Carpenter, Throttling,** for determining the heating value of steam; complete with accurate steam thermometer to 400° F., mercury pressure gauge with sliding scale, ¼-inch globe valve, rubber tubing to connect calorimeter to mercury gauge, bottle of mercury and mercury filler; in hardwood carrying case. Descriptive pamphlet sent upon request **48.00**

1683. **CALORIMETER—Steam, Separating,** complete with 3-inch test gauge, ½-inch globe valve and connecting nipple; in hardwood carrying case. Descriptive pamphlet sent upon request **72.00**

1685. **CALORIMETER—Sargent, for gas,** to determine the calorific value, as well as the foreign matter in gases, quickly, accurately and continuously. (For cut see next page) **295.00**

Apparatus Consists of:

1 Calorimeter body with automatic attachment; Bunsen Burner, tubing, beaker and mirror.
2 Thermometers graduated in 1/10° (1 for inlet and 1 for outlet).
1 Wet pressure governor.
1 Wet Test Gas meter with all attachments.
1 Scale 10 lbs. with weights.
2 Balanced weighing pails of heavy copper, tinned inside.
2 Thermometer Reading Lenses.
1 Special exhaust thermometer.

For prices of extra parts, see next page.

1685

Extra Parts for 1685

A. Calorimeter body with automatic attachment	**150.00**
B. Two Thermometers (inlet and outlet) ..... each	**14.00**
C. Wet pressure governor	**20.00**
D. Wet test gas meter	**75.00**
E. 10 lb. scale with weights	**20.00**
F. Nickel plated weighing pails	**6.50**
G. Two thermometer reading lenses.. each	**3.00**
H. Exhaust thermometer	**2.50**

1686

1694

1686. CALORIMETER—Junker, for gas. Latest form, with thermometers on the same level. The standard instrument for accurately determining the heating value of gas; requires little time for making a determination, which may be attended to by an inexperienced person.

The complete apparatus packed in three portable boxes **350.00**

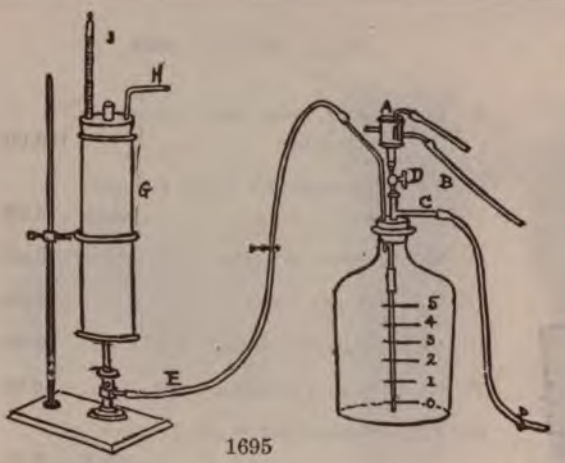
1688. *The Calorimeter proper, in case, with standard thermometers, graduated glasses, etc ... **220.00**

1690. *The meter in liters or cubic feet, with case **85.00**

1692. The pressure regulator (wet) **30.00**

1694. In place of graduates for measuring the quantity of water, a balance with graduated beam 10 lb. to $\frac{1}{100}$ may be used to obtain its exact amount by weight; with water container **25.00**

** Metric graduated glasses and centigrade thermometers are supplied unless glasses graduated in English pounds and thermometers in Fahrenheit are required. No extra charge for the latter.*

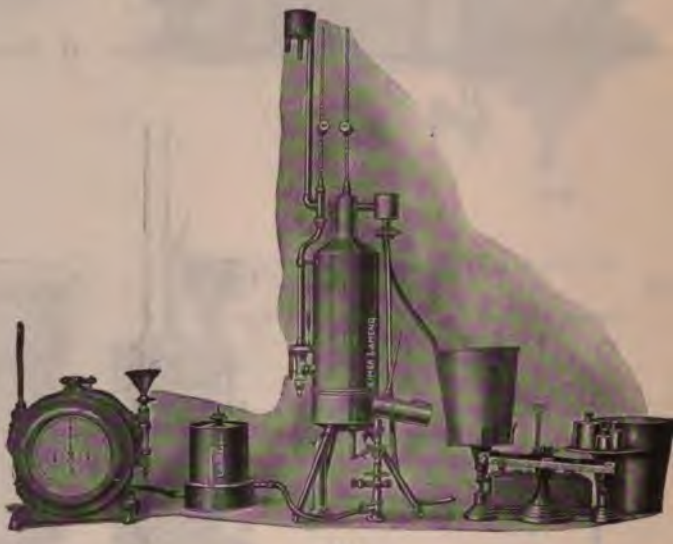


1695

1695. CALORIMETER—Graefe, for Gas. A handy and inexpensive substitute for the Junker Calorimeter, for use where extreme accuracy is not essential. It is well adapted for the testing of illuminating gas, coke oven, sulphur, and distillation gases **60.0**

Directions for operation with outfit.

1697. CALORIMETER—Hinman-Junker, American improved make, operates on the same principles as the old type Junker Calorimeter. The complete apparatus with all improvements in wooden carrying cases **455.00**



1697

Apparatus Consists of: 2 High Grade Calorimeter Thermometers; 1 Exhaust Thermometer; 1 Tes Meter 1/10 cu. ft. per revolution, index reading 1/1000th of a cu. ft. to 100 cu. ft. fitted with thermome ter, etc.; 1 Wet Regulator with pressure gauge; 1 Balance with agate bearings, beam weighing 1/1 pound to 1/1000th part of a pound; 2 Copper water pails; 1 Set of Weights in block, 1/10 to 10 lbs. 1-25 cc. Graduated Cylinder; 12 ft. Rubber Tubing; 1 Special Brass Wire Brush; 1 Correction Tabl for temperature and barometric pressure.

1697A. Calorimeter proper, in case, with standard thermometers, and graduated glass **245.0**

1697B. Meter only in liters or cubic feet **88.0**

1697C. Pressure regulator (wet) only **30.0**

1697D. Balance, with agate bearing and forked pailholder, complete with weights **52.5**

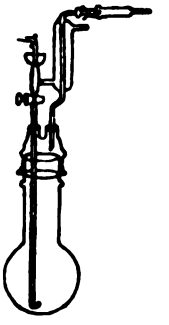
1697E. Thermometer for above, scale engraved on the stem, with screw cap, reading from 45° to 95° F. in 1/10th **22.5**

1697F. **Ditto**—reading from 60° to 110° F. in 1/10th **22.5**

Gas Calorimeter Bulletin sent on request.

1710

1714



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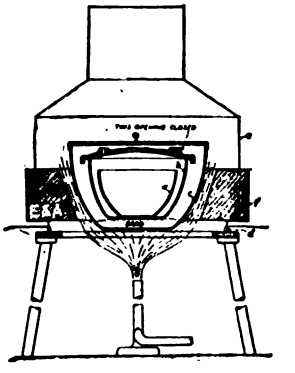


1719

1710. **CALORIMETER—Bunsen Ice.**

Size	small	medium	large
Each	2.10	3.00	3.75

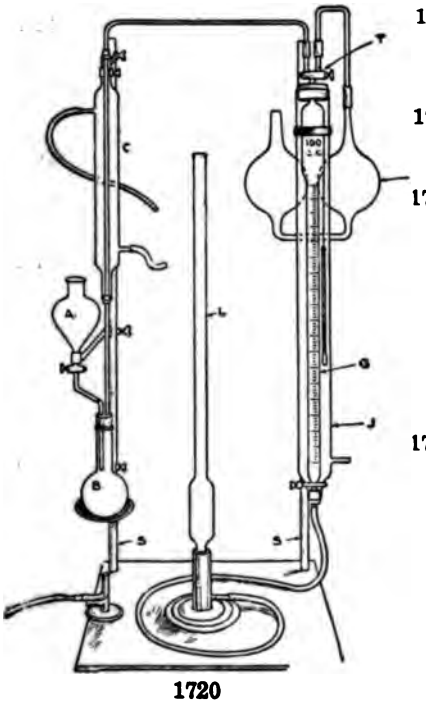
1711. **CAN—Aluminum.** With fit over covers, extensively used in the determination of moisture in soil.

Capacity, cc.	125	250	500
Diameter, inches	3½	3½	3½
Height, inches	⅝	1½	3
Each	.60	.90	1.20

1712. **CANDLES—Standard Sperm,** for photometric tests ..... per pound **2.60**

1713. **CANDLES—common paraffin** ..... dozen **.35**

1713A. **CANDLES—Colored Wax,** 48 pcs. to box ..... per box **.70**



1720

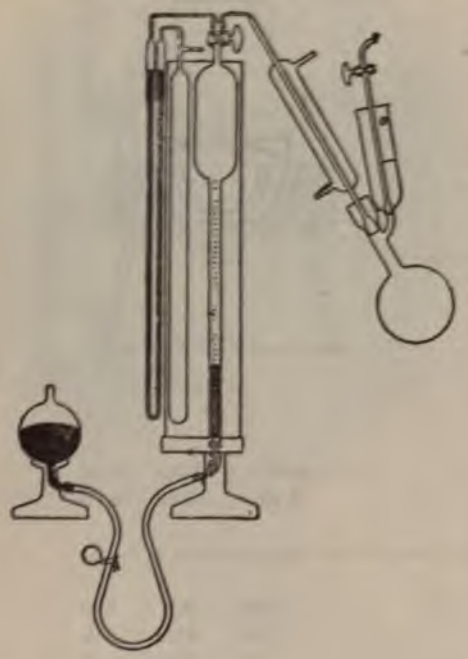
1714. **CAPSULES—Of very thin glass,** used in Organic Analysis, 2¼ inches diameter..... per dozen **2.40**

1718. **CARBON APPARATUS—Finkner,** for determination of carbon in iron **11.00**

1719. **CARBON AND POUR TEST APPARATUS —Conradson,** for determining carbon residue. The Pour Test indicates the temperature at which a sample of oil in a cylindrical container of specified diameter and length will just flow under specified conditions. Exact specifications and method of operation with order **18.00**

1720. **CARBON APPARATUS—Parr,** for the determination of total carbon in coal, coke, etc., in conjunction with the Parr Calorimeter. The residue from the B. T. U. determination, which has the carbon of the coal combined in the form of Sodium Carbonate, is treated with acid, liberating the CO_2 under conditions that make it available for measurement.

The outfit as illustrated, with directions and tables **52.00**



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1722. **CARBON APPARATUS—Lunge,** for determination of carbon in iron; complete as illustrated. See also under Combustion Apparatus and Colorimeters. **27.50**

1726. **CARBON DIOXIDE APPARATUS (CALCIMETER)—Scheibler-Finkner,** for determining carbon dioxide in limestone and marble **28.00**

1730

1728. **CARBON DIOXIDE APPARATUS—Scheibler,** for estimating carbon dioxide in bone black, etc. **25.00**

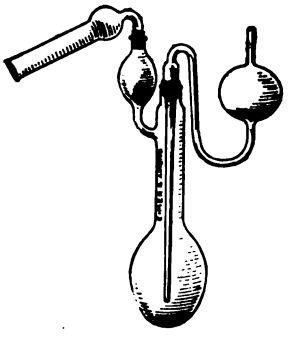
1728A. Extra bottles with tubulated glass stoppers .....each **2.00**

1728B. Extra rubber caps or bags .....each **.55**

1728C. Thin rubber balloons for the apparatus .....each **.20**

1730. **CARBON DIOXIDE APPARATUS—Scheibler,** for the estimation of carbon dioxide in saturated gases **32.00**

1732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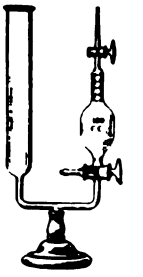
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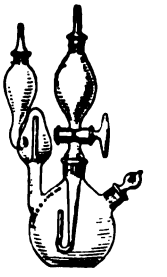
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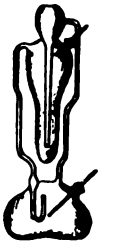

1740

1732. CARBON DIOXIDE DETERMINATION APPARATUS—Berzelius **1.60**

1734. Ditto—Bunsen **2.20**

1736. Ditto—Boyer, for determining CO_2, especially in beer **9.25**

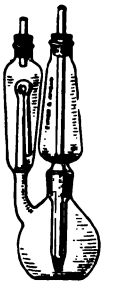
1738. Ditto—Geissler, new form **4.20**

1740. Ditto—Geissler, for one acid **2.10**

1742

1744

1746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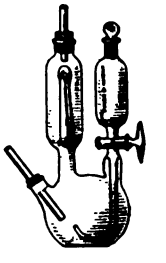
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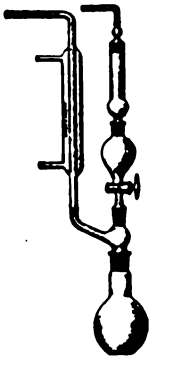

1754

1742. CARBON DIOXIDE DETERMINATION APPARATUS—Geissler, for two acids. **3.00**

1744. Ditto—Kipp, with glass stopcock **3.50**

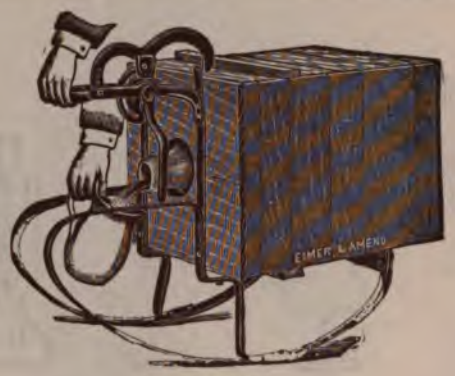
1746. Ditto—Mohr, latest form **4.45**

1748. Ditto—Rose & Geissler **2.75**

1750. Ditto—Rohrbeck **3.75**

1752. Ditto—Schroetter **4.65**

1754. Ditto—Knorr, for the determination of CO_2 in carbonates, by absorption. All glass parts ground together **9.00**



1758

E. & A. Carboy Inclinator

Commemorative Medal awarded "First International Exposition of Safety and Sanitation" New York City, 1913.

1756. **CARBOY—Glass,** capacity 10 gallons, boxed **9.00**

1757. **CARBOY—Glass,** capacity 12 gallons, boxed **11.00**

1758. **CARBOY INCLINATOR—Universal, E. & A., Patented.** A simple device for emptying a carboy with little exertion, and without spilling or splashing. A single movement of the lever locks the inclinator to the carboy, which by an ingenious curvature of the rockers is kept in an upright position when not in use. The carboy can be completely emptied with ease **10.00**

CARBOY PUMPS—see Pumps.

1765

1769

1774

1772

1773

Casseroles

1765. **CASSEROLE—best American porcelain,** Coors make, with porcelain handles.

No.	1	2	3	3a	4	4a	5	6	7
Capacity, cc.	30	75	150	210	375	500	750	1250	2000
Diameter, cm.	5	7	8.5	9.5	11.0	13.5	13.5	16.5	17.5
Each	**.42**	**.48**	**.60**	**.84**	**1.08**	**1.38**	**1.68**	**2.40**	**4.20**

1769. **CASSEROLE—American porcelain,** with porcelain cover and wooden handle.

Capacity, cc.	125	250	375	500	720	1000
Diameter, cm.	9.0	10.5	11.0	12.0	15.2	17.2
Each	**.65**	**.75**	**1.00**	**1.25**	**2.00**	**2.50**

1772. **CASSEROLE—Agate ware,** with handle.

Capacity, cc.	500	750	1000	2000
Diameter, cm.	11	12.5	15	18
Each	**.42**	**.46**	**.60**	**.66**

1773. **CASSEROLE—Aluminum ware,** with handle.

Capacity, cc.	500	1000	2000
Diameter, cm.	12.5	15	18
Each	**.66**	**.88**	**1.25**

1774. **CASSEROLE—Opaque Fused Silica, "Vitreosil"** glazed throughout, with handle.

No.	1	2	3	3a	4
Capacity, cc.	30	75	150	200	350
Diameter, cm.	5	7	8.5	9.5	11
Each	**2.35**	**2.85**	**3.50**	**4.50**	**5.85**

1774/1. **CASSEROLE—Opaque Fused Silica,** American make, glazed throughout.

No.	1	2	3	3a	4
Capacity, cc.	30	75	150	200	350
Diameter, cm.	5	7	8.5	9.5	11
Each	**2.19**	**2.69**	**3.31**	**4.25**	**5.50**

1775

1775/1

1775. **CATHETOMETER**—This reading Telescope with support consists of a heavy tripod with steel leveling screws and is fitted with convenient vertical adjustments which make it very suitable for reading thermometers or following any vertical motion. A rack and pinion adjustment of 150 mm. range is provided in the top slide and a hand adjustment of 100 mm. range is given in the lower support tube, which also permits rotation. The Telescope has an objective of 25 mm. aperture and about 200 mm. focal length, and also has a rack and pinion adjustment **68.75**

1775a. **SCALE** for above, of celluloid, 50 cm. long, 0 in center **6.50**

1775/1. **CATHETOMETER**—range 65 cm., designed to meet the demand for a Cathetometer of great accuracy. The vernier reads 0.05 mm. A handle is attached for conveniently rotating the vertical column. The telescope has an aperture of 25 mm., is fitted with rack and pinion adjustment on the eye end, and has an extra objective to draw tube, which permits focusing to about 55 cm., from the objective. The magnification at this distance is about 18 diameters and the field 20 mm. The telescope is fitted with a sensitive level and is easily reversible in the Ys. The necessary adjustments for level and telescope are provided **310.00**

1777. **CEMENT—Alundum Refractory RA 162** for embedding alloy wires in the construction of small electric furnaces and similar appliances, the Cement RA 162 is the most suitable mixture and has been found generally serviceable ..... **1 lb. .40**
10 lb. 1.80

1777/1. **CEMENT—DeKhotinsky,** 2 oz. sticks ..... **stick 1.10**
per pound 8.25

Hard —For cementing glass, metals and porcelain.
Medium—For cementing and insulating purposes.
Soft —For insulating and covering electric wires, for condensers, Static machines, protection against corrosion, and cementing rubber, hard rubber, wood, ivory, etc.

1778–1780

1781

Cement Testing Apparatus

Balances for Cement, see Balances.

Sieves, Standard, for Cement, see Sieves.

1778. **CEMENT TESTING MACHINE—U. S. Standard Automatic Cement Tester,** complete as illustrated, including one pair of Solid Back Cement Grips and one Brass Mould for tensile briquettes, capacity 1000 lbs. **175.00**

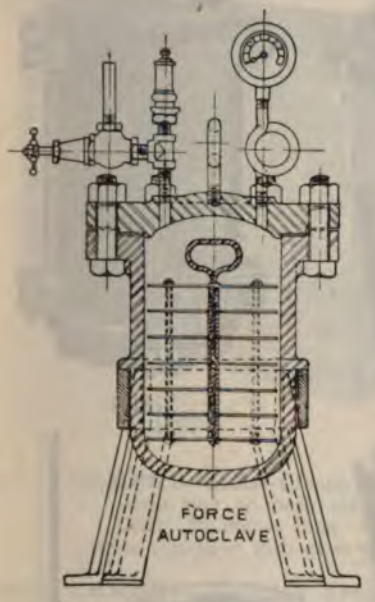
1780. **Ditto**—Capacity 2000 lbs. **285.00**

Exact description and method of operation sent on request and with order.

1781. **CEMENT TESTING MACHINE—Hydraulic Hand Power, U. S. Standard;** an improved type of Crushing machine, particularly adapted for cement or concrete cubes **685.00**

The adjustment is made by means of hand wheel and screw. The upper tool is made ball seated to allow for non-parallel specimens, and tends to cause a double pyramid form of fracture. The load is read on a hydraulic gauge.

Size of machine, 72 inches high, 44 inches long, and 30 inches wide, weight 1200 lbs., capacity 50,000 lbs.



1783

1784

1786

1788

1790

1783. **CEMENT—Autoclave,** for the boiling test of cement, according to suggestions of H. J. Force, Engineer of Tests, Delaware, Lackawanna & Western Railroad; with metal rack for holding briquettes in the chamber **180.00**

The body, inside dimensions, 12 x 7 inches, cover and clamp are made of a special alloy steel; the cover is provided with a steam gauge registering up to 400 pounds, and also a pop safety valve which may be set to blow off at 300 pounds; an angle relief valve is provided to relieve the pressure at the expiration of the test. The cover is fastened to the cylinder of the autoclave by means of a hinged clamp made in two halves; this construction obviates the use of any bolts for fastening, and as the clamp encircles the entire cylinder, uniform pressure is exerted on the cylinder cover, thus insuring an absolutely tight joint. A rack for supporting the briquettes to be tested is supplied with the apparatus which is made most substantially, and is mounted on suitable support.

Other Autoclaves for boiling test of cement, see Nos. 174 and 175.

1784. **CEMENT—Briquette Mould, of brass,** with means to separate sections automatically without rapping; according to specifications of the American Society for Testing Materials **4.40**

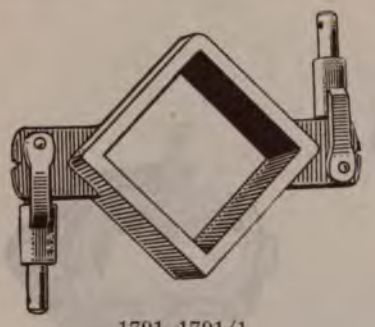
1786. **Ditto**—With end clamps, according to specifications of the American Society for Testing Materials **4.40**

1788. **Ditto**—With large iron horseshoe shaped clamp **4.40**

1788a. Extra Clamps, each ..... **.50**

1790. **CEMENT—Briquette Gang Moulds,** of brass, with end and centre clamps, according to specifications of the American Society for Testing Materials.

Size, gang	2	3	4	5	6
Each	**8.75**	**13.25**	**17.50**	**22.00**	**26.25**

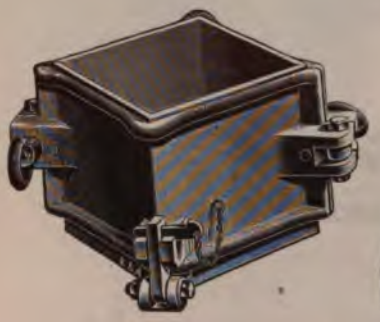


1791–1791/1

1791/5

1794

1791/7



1791/6

1796

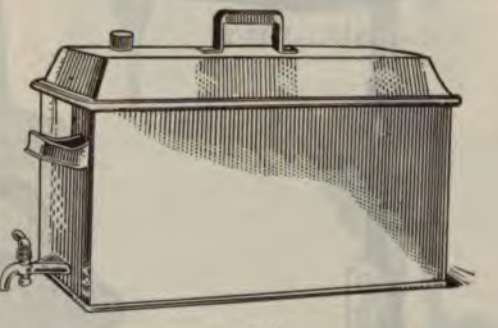
1791/8

1791/9

1792

1791.	**CEMENT—Cube Mold,** with hinged clamp of brass, 1 gang for 1 inch cubes	**5.25**
1791/1.	**CEMENT—Cube Mold,** with hinged clamp of brass, 1 gang for 2 inch cubes	**7.00**
1791/2.	**CEMENT—Cube Mold,** with hinged clamp of brass, 2 gang, 1 inch cube	**15.00**
1791/3.	**CEMENT—Cube Mold,** with hinged clamp of brass, 3 gang, 1 inch cube	**18.50**
1791/4.	**CEMENT—Cube Mold,** with hinged clamp of brass, 2 gang, 2 inch cube	**22.00**
1791/5.	**CEMENT—Cube Mold,** with hinged clamp of brass, 3 gang, 2 inch cube	**30.00**
1791/6.	**CEMENT—Cube Mold,** of cast iron, 6 inch cube, with detachable base plate	**30.00**
1791/7.	**CEMENT—Mold,** cylindrical, of cast iron, with detachable base plate and hinged clamps, 16″ deep, 8″ diam.	**30.00**
1791/8.	**CEMENT—Pat Mold,** used for forming pats of cement intended for steaming tests	**3.50**
1791/9.	**CEMENT—Tamper,** for pressing cement in mold	**6.00**
1792.	**CEMENT—Sampler,** for obtaining samples of cement in the centre of the barrel. The point being an auger, enables one to bore through the staves	**15.00**
1794.	**CEMENT—Plate,** of ground glass; for placing moulds on whilst being filled; size 24x24 inches	**8.00**
1796.	**CEMENT—Pan,** of galvanized iron; for immersing briquettes in water until ready for testing; size 24x24x3 inches	**4.00**

1797



1797/1

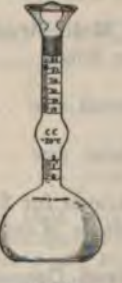
1797. **CEMENT—Moist Closet,** made of soapstone and provided with wooden doors covered with zinc on both sides and held with iron strap hinges; size of closet 36 inches high, 30 inches long, 17 inches wide.
Price complete with glass shelves **200.00**

1797/1. **CEMENT—Steaming Apparatus,** for boiling and steaming test specimens, very heavy copper, with stand, size 12x12x24" **78.75**

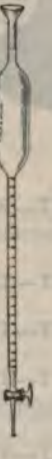
1800

1802

1804



1806



1808

1800. **CEMENT—Specific Gravity Bottle, Schuman,** graduated 50 cc. in 1/10th **3.20**

1802. **Ditto—Candelot,** graduated 0-40 cc. in 1/10th **4.00**

1804. **Ditto—Le Chatelier,** capacity of bulb 20 cc., neck above bulb graduated 0-3 cc. in 1/10ths **2.00**

1806. **Ditto—Le Chatelier,** of special form and dimensions recommended by the Bureau of Standards (see Circular No. 33, Bureau of Standards) for the Government Specifications for Portland Cement **6.00**

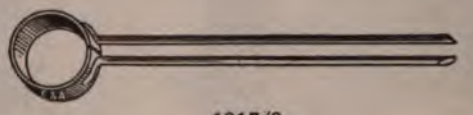
1808. **Ditto—Specific Gravity Apparatus, Jackson,** consisting of burette, graduated to give direct readings in specific gravity; with heavy glass Erlenmeyer shape flask, glass stoppered, and thermometer. Complete with table and instructions **13.00**

1810. **The Burette and flask only** **9.25**

1812. **Extra flasks** **3.50**

1817/1–1817/2

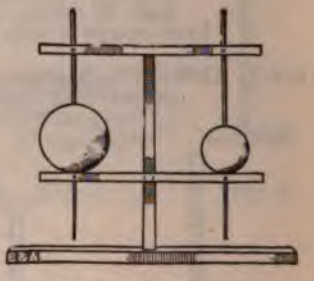
1817



1817/3

1818

1819



1819/1

1817. **CEMENT—Briquette Mold Brushes,** with brass wire and wooden handle.
Brush portion 5 inches long **1.35**

1817/1. **CEMENT—Trowel,** small size **1.35**

1817/2. **CEMENT—Trowel,** large size **1.60**

1817/3. **CEMENT—Test Apparatus for Soundness, Le Chatelier.** This apparatus is employed to determine soundness of cement, by its expansion after being boiled **5.25**

1817/4. **CEMENT—Testing Sand Ottawa Standard** ..... per lb. **.15**
In 100 lb. bags ..... per lb. **.06**

1818. **CEMENT—Vicat Needle Apparatus, Improved,** for testing the proper consistency of cement, and time of setting. Does not require an extra compensating weight to give a downward pressure of 300 grams, when the 1 mm. needle is used **29.00**

1818a. Extra hard rubber ring moulds **3.00**

1818b. Extra needle, large, 1 cm. **1.00**

1818c. " " small, 1 mm. **1.00**

1819. **CEMENT—Gilmore Needle,** consisting of a steel needle 1/12 inch in diameter, loaded with a weight of ¼ pound, and another needle 1/24 inch in diameter loaded, with weight of 1 pound.
In block **8.00**

1819/1. **Ditto**—mounted in a vertical position so that it is perpendicular to the surface of the pat **9.75**

1830
with arm 1848

1854

1876

Centrifuges

Do not fail to specify voltage. If current is A. C., indicate No. of phases and cycles.

CENTRIFUGE, PURDY ELECTRIC—These machines are mounted on very heavy iron base, giving the rigidity necessary for accurate work. The centrifuges for 110 volts D. C. and 105 volts A. C. 60 cycle are arranged with rheostat in base, giving medium and high speed.

1830. **CENTRIFUGE—Purdy Electric.** For examination of urine, etc., with urine arm carrying two bulbs, with two each glass sediment and graduated percentage tubes. For 110 volts D. C. **48.00**
1830/1. **Ditto**—for 110 volts A. C. 60 cycle **48.00**
1832. **CENTRIFUGE—Purdy Electric.** Similar to No. 1830 but for 220 volts D. C. with speed regulator **58.00**
1832/1. **Ditto**—for 220 volts A. C. 60 cycle **58.00**
1834. **CENTRIFUGE**—Same as No. 1830, with urine arm carrying four tubes, with four each plain sediment and graduated percentage tubes. For 110 volts D. C. **54.75**
1834/1. **Ditto**—for 110 volts A. C. 60 cycle **54.75**
1836. **CENTRIFUGE**—Same as No. 1834, but for 220 volts D. C. with speed regulator **64.75**
1836/1. **Ditto**—for 220 volts A. C. 60 cycle **64.75**

Accessories

1838. Graduated Urine Tubes, 15 cc., with tapering tip ..... each **.55**
dozen **6.00**
1840. Plain Urine Tubes, 15 cc. capacity ..... each **.15**
dozen **1.50**
1842. Hematocrit, with two graduated blood tubes and two plain sputum tubes **6.00**
1844. Precipitating Arm, with two tapering tubes for the manipulation of Micro-organisms... **6.00**
1846. Urine Arm, with two Aluminum Shields, two plain tubes and two graduated tubes **6.00**
1848. Urine Arm, with four Aluminum Shields, four plain tubes and four graduated tubes **10.20**
1850. Urine Arm, with eight Aluminum Shields, eight plain tubes and eight graduated tubes.. **16.80**
1852. Dome Protector **11.40**
1854. **CENTRIFUGE—Purdy Electric,** for the rapid determination of phosphorus in steel, by the Goetz method. With aluminum arm, fitted with conical aluminum tube holders and graduated Goetz Tubes. With rheostat for 110 volts D. C.

	For tubes	2	4
	Each	**66.00**	**75.00**
1854/1.	**Ditto**—for 110 volts A. C. 60 cycle	**66.00**	**75.00**
1856.	**CENTRIFUGE**—Same as No. 1854, but with rheostat for 220 volts, D. C.	**76.00**	**83.00**
1856/1.	**Ditto**—for 220 volts A. C. 60 cycle	**76.00**	**83.00**

1858. Graduated Goetz Tubes, glass stoppered ..... each **1.35**
1860. Graduated Goetz Tubes, not stoppered ..... each **1.20**
1862. **CENTRIFUGE—Purdy Electric,** for testing coal oil, etc., with arm carrying metal shields and 50 cc. graduated tubes. With rheostat for 110 volts D. C.

	For tubes	2	4
	Each	**56.25**	**63.00**
1862/1.	**Ditto**—for 110 volts A. C. 60 cycle	**56.25**	**63.00**
1864.	**CENTRIFUGE**—Same as No. 1862 but with rheostat for 220 volts D. C.	**66.25**	**71.00**
1864/1.	**Ditto**—for 220 volts A. C. 60 cycle	**66.25**	**71.00**

1866

1865. **GLASS TUBES**—for centrifuges Nos. 1862–1864/1, 50 cc. plain....each .30
1865/1. **Ditto**—graduated .....each .75
1866. **CENTRIFUGE—E. & A. Electric.** This machine is substantially constructed, and less liable to get out of order than similar type machines. The dome protector with cover made of copper, polished, is very desirable, as it protects the operator from danger of flying particles, etc., and lessens the air resistance, thereby increasing the speed of the machine. Complete with arm carrying aluminum shields for 15 cc. tubes, and plain, and graduated tubes. With rheostat for 110 volts D. C.

	2	4
For tubes		
Each	58.00	65.00

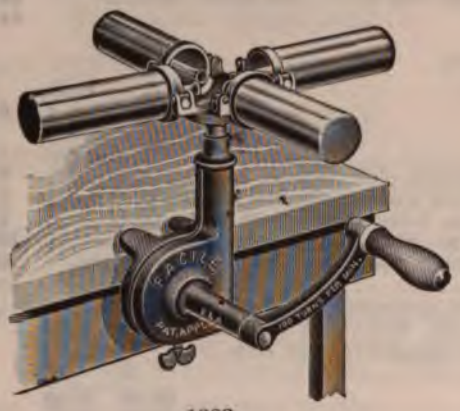
1866/1. **Ditto**—for 110 volts A. C. 60 cycle 58.00 65.00
1868. **CENTRIFUGE**—Same as No. 1866 but with rheostat for 220 volts D. C.

	2	4
For tubes		
Each	65.00	72.50

1868/1. **Ditto**—for 220 volts A. C. 60 cycle 65.00 72.50

Accessories

1870. Arm with aluminum shields for two 50 cc. tubes for oil testing, with 2 plain glass tubes **price on application**
1872. **Ditto**—for 4-50 cc. tubes, with 4 plain glass tubes .....**price on application**
1874. Extra heavy glass tubes, 50 cc. plain ..... dozen 2.40
1874/1. " " " " 50 cc. graduated ..... each .90
1876. **CENTRIFUGE—E. & A., Hand power,** with arm carrying two aluminum tube shields for 15 cc. tubes. For cut, see preceding page 12.00
1878. Graduated glass tubes, 15 cc. capacity ..... each .55
1880. Plain glass tubes, 15 cc. capacity ..... each .15
dozen 1.50
1880/1. Aluminum Shields, conical, for 15 cc. tubes ..... each .35
1880/2. Brass Shields, conical, for 15 cc. tubes ..... each .90

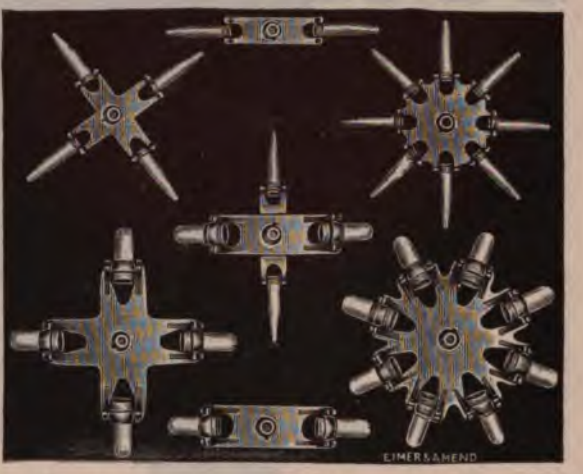


1882

1884

1882. **CENTRIFUGE—Hand,** for testing milk, oil, etc. Turns easily and can be attached to any table. The working parts consist of but two cut steel spiral gears enclosed in an iron case; with four seamless brass holders, 5¼x1⅜ inches inside diameter..... 10.00
Plain glass oil tubes to fit holders ..... dozen 3.60
1883. **Ditto**—with two brass holders 9.00
1884. **CENTRIFUGE—Water** power, for analysis of urine, oils, etc. These machines need no attention, and may be left running constantly; with hose connection, two each graduated and plain tubes, and arm for four 15 cc. 20.00
1886. **Ditto**—With arm for two 50 cc. tubes 21.00
1888. **Ditto**—With arm for four 50 cc. tubes 24.50

1890/1896
SIZE 1 CENTRIFUGE
Showing 8-tube combination head.



50 cc. and 15 cc. Heads and Tubes
Showing interchangeable heads.

Centrifuges—International Electric

Adapted for practically every kind of scientific research and routine laboratory work. These high power machines are compact and most substantially built. A bell shaped casting furnishes rigid base, which serves as a housing for the electric motor, and strong bearing for the shaft extension which carries the centrifuge heads. The tube shields are made of bronze, and are much stronger and more durable than aluminum shields. A speed control rheostat is supplied with each machine; various heads are adapted to each machine, these being listed separately.

Size 1 Centrifuge

Height closed 23 inches, open 33 inches, diameter 18 inches. Speed with 8-tube head, 3000 r. p. m. Shipping weight about 270 lbs.

The following heads may be used with this centrifuge: 2-tube, 4-tube and 8-tube heads carrying 15 cc. tubes; 4-tube or 8-tube head, carrying trunnion rings and metal shields for 50 cc. glass tubes, or metal trunnion cups for Babcock Test Bottles; 4-tube combination head with two 15 cc. and two 50 cc. tubes or 8-tube combination for four 15 cc. and four 50 cc. tubes. Board of Health head carrying 20 straight 2 cc. glass tubes for sediment, bacteria and leucocyte tests in milk, etc.

Continued on next page.

CENTRIFUGES—INTERNATIONAL ELECTRIC—Continued.

The Centrifuges Listed Below Include Speed Control Rheostat, but not Equipment of Heads and Tubes.

For cuts and description see preceding page.

1890.	Size 1, 110 volts D. C.	172.00
1892.	Size 1, 220 volts D. C.	172.00
1894.	Size 1, 110 volts A. C., 60 cycle	172.00
1896.	Size 1, 220 volts A. C., 60 cycle	172.00

The Equipment Listed Below is Applicable to all Size 1 Centrifuges.

1898.	2-tube 15 cc. head and attached trunnion rings	4.30
1900.	4-tube 15 cc. head and attached trunnion rings	10.00
1902.	8-tube 15 cc. head and attached trunnion rings	17.20
1903.	2-tube 50 cc. head only	5.00
1904.	4-tube 50 cc. head only	10.00
1906.	4-tube combination head only, with attached 15 cc. trunnion rings for 2 each 15 cc. and 50 cc. tubes	10.00
1908.	8-tube combination head only with attached 15 cc. trunnion rings for 4 each 15 cc. and 50 cc. tubes	18.00
1909.	2-place head only, for 2 Goetz tubes and 250 cc. bottle	5.00
1910.	8-tube 50 cc. head only. (Heads for 50 cc. tubes can be used for Babcock cups)	16.00
1912.	Board of Health Disc, without tubes	17.50
1913.	5 inches Diameter perforated bronze basket with copper drip can	34.00
1913A.	15 cc. metal tubes, Cornell style, with rubber cushions ... each	.80
1913B.	Reducing caps for 15 cc. glass tubes in 50 cc. metal tubes ... each	.22
1913C.	Reducing caps for 25 cc. glass tubes in 50 cc. metal tubes ... each	.22
1913D.	50 cc. metal tubes, Cornell style, with rubber cushions ... each	.95
1913E.	50 cc. trunnion rings ... each	.60
1913F.	Babcock test trunnion cups with rubber pads ... each	.90
1913G.	Trunnion cups for 250 cc. bottles with rubber cushions, to be used on head No. 1909	5.00
1913H.	Trunnion carriers for 150 cc. Squibb separatory funnels, to be used on head No. 1909	3.00
1913I.	Trunnion carriers for Shaw separatory funnels, to be used on head No. 1909	2.25
1913J.	Trunnion carriers for Goetz phosphorus tubes, to be used on head No. 1909	3.50
1914.	15 cc. plain glass tubes ... per doz.	2.20
	per 6 doz.	8.75
1916.	15 cc. in 1/10 cc. graduated glass tubes ... per ½ doz.	3.25
1917.	25 cc. plain glass tubes ... per doz.	2.75
1918.	2 cc. Board of Health tubes ... per 100	6.50
1919.	10 cc. Hopkins Vaccine Tubes ... each	1.20
1919A.	Babcock test tubes for human milk ... each	.60
1920.	50 cc. plain glass tubes ... per doz.	2.75
	per gross	22.00
1921.	50 cc. plain narrow neck glass tubes ... per doz.	2.75
1922.	50 cc. graduated glass tubes, ½ cc. div. to 10 cc., 1 cc. div. to 50 cc. ... per ½ doz.	5.50
1923.	Hart Casein Tubes ... per ½ doz.	3.20
1923A.	250 cc. glass prescription bottles ... per doz.	2.50
1923B.	Squibb glass separatory funnels, 150 cc. ... each	3.50
1923C.	Goetz glass phosphorus tubes, with stoppers ... each	3.50
1923D.	250 cc. glass sterilizer bottles ... per doz.	3.75
1923E.	Rubber stoppers for Board of Health tubes ... per 100	2.25
1923F.	Square sputum bottles with corks ... per doz.	.85
1923G.	Speed revolution counter	2.50
1923H.	Cast-iron stand for mounting size 1 Centrifuges	20.00
1923I.	2-bottle shaker head for use on size 1 Centrifuge	28.50

1924–1930

SIZE 2 CENTRIFUGE—Showing 8-tube head.

Size 2 Centrifuge

Height closed 28 inches, open 40 inches.
Diameter 24 inches, shipping weight about 450 lbs.

Characteristics of strength, stability, speed and the same graceful proportions of the size 1 Centrifuges, are preserved in the design of the size 2 machine. The dimensions, however, are greater, affording larger capacity and greater variety of equipment. The motor is correspondingly larger and of greater power, though not of higher speed than size 1.

A lubricating system has been developed for the upper bearing, having a reservoir of oil that requires very little attention. A band brake has been added to the shaft and a device applied to the brush holders, by which the tension of the brushes can be removed when it is desired to let the centrifuge come to rest as slowly as possible.

The Centrifuges Listed Below Include Speed Control, Rheostat, but no Equipment of Heads and Tubes.

1924.	Size 2, 110 volts D. C.	**255.00**
1926.	Size 2, 220 volts D. C.	**255.00**
1928.	Size 2, 110 volts A. C., 60 cycle	**255.00**
1930.	Size 2, 220 volts A. C., 60 cycle	**255.00**

The Equipment Listed Below is Applicable to all Size 2 Centrifuges.

1932.	4-tube head only for 15, 50, 100 cc. plain tubes, 100 cc. oil tubes and Babcock cups..		10.00
1933.	2-place head only for 15, 50, 100 cc. plain tubes, 100 cc. oil tubes and Babcock cups..		5.00
1933A.	4-place combination head only for 250 cc. bottles and 250 cc. conical cups		17.50
1934.	8-tube head only for 15, 50, 100 cc. plain tubes 100 cc. oil tubes and Babcock cups..		16.00
1935.	8-tube combination head only for 2-250 cc. bottles; 6-15, 50 or 100 cc. tubes		20.50
1936.	16-tube head only		27.25
1938.	Board of Health disc, without tubes		17.50
1940.	2-place head only for 250 cc. conical cups		12.25
1942.	4-place head only for 250 cc. bottles and 250 cc. conical cups		17.50
1943.	11″ diam. perforated bronze basket with copper drip can		50.00
1944.	15 cc. metal tubes, Cornell style, with rubber cushions	each	.80
1946.	15 cc. trunnion rings	each	.65
1947.	Reducing caps for 15 cc. glass tubes in 50 cc. metal tubes	each	.22
1947A.	Reducing caps for 25 cc. glass tubes in 50 cc. metal tubes	each	.22
1948.	50 cc. metal tubes, Cornell style, with rubber cushions	each	.95
1950.	50 cc. trunnion rings	each	.60
1952.	100 cc. metal tubes, Cornell style, with rubber cushions	each	1.15
1954.	100 cc. trunnion rings	each	.60
1955.	Babcock test trunnion cups, with rubber pads	each	.90
1956.	Trunnion cups for 250 cc. bottles	each	5.00
1958.	Trunnion carriers for 150 cc. Squibbs funnels	each	3.00
1959.	Trunnion carriers for Shaw separatory funnels	each	2.25
1960.	15 cc. **plain** glass tubes	per doz.	2.20
		per gross	17.50
	15 cc. in 1/10 cc. **graduated** glass tubes, see No. 1916.		
1961A.	25 cc. **plain** glass tubes	per doz.	2.75
1961B.	10 cc. Hopkins Vaccine tubes	each	1.20
1961C.	Babcock test tubes for human milk	each	.60
1962.	50 cc. **plain** lipped glass tubes	per doz.	2.75
1963.	50 cc. **plain** narrow neck glass tubes	per doz.	2.75
		per gross	22.00
1963A.	50 cc. **graduated** glass tubes ½ cc. div. to 10 cc., 1 cc. div. to 50 cc.	per ½ doz.	5.50
1963B.	Hart Casein tubes	per ½ doz.	3.20
1964.	100 cc. plain lipped glass tubes	per doz.	3.35
		per 6 doz.	13.50
1964A.	Shaw separatory glass funnels for butter testing about 75 cc.	each	3.35
1964B.	Squibb glass separatory funnel, 150 cc.		3.50
1964C.	Goetz glass phosphorus tubes, with stoppers		3.50
1964D.	250 cc. sterilizer bottles	per doz.	3.75
1964E.	2 cc. Board of Health glass tubes	per 100	6.50
1964F.	Rubber stoppers for Board of Health glass tubes	per 160	2.25
1964G.	Set of 20 Board of Health tubes, and 40 stoppers		2.75
1964H.	Square sputum bottles with corks	per doz.	.85
1964I.	Speed revolution counter		2.50
1964J.	Cast iron stand for mounting size 2 centrifuge		24.00
1964K.	4-bottle shaker head for use on size 2 centrifuge		34.50

1965–1965/3

Electric Milk Centrifuges

All of the Babcock Centrifuges listed below are supplied with head, trunnion buckets, speed control rheostat, but without glassware or heater.

16-Bottle Electric Babcock Tester

Height closed 23 inches; open 35 inches; Diameter 24 inches. Shipping weight about 300 lbs.
Takes standard 6-inch Babcock test bottles and, with cups, takes 9-inch Cream test bottles.

1965.	110 volts D. C.	233.00
1965/1.	220 volts D. C.	233.00
1965/2.	110 volts A. C., 60 cycle	233.00
1965/3.	220 volts A. C., 60 cycle	233.00

24-Bottle Electric Babcock Tester

Height closed 28 inches; open 40 inches; diameter 24 inches. Shipping weight about 450 lbs.
Takes standard 6-inch and 9-inch test bottles.

1965/10.	110 volts D. C.	285.00
1965/11.	220 volts D. C.	285.00
1965/12.	110 volts A. C., 60 cycle	285.00
1965/13.	220 volts A. C., 60 cycle	285.00

Accessories

1965A.	Long metal cups for 9″ Babcock bottles	each	1.15
1965B.	Trunnion rings for Babcock cups	each	.60
1965C.	Babcock Milk Test Bottles, 8% in 1/10% div. U. S. Standard	per doz.	3.50
1965D.	Babcock Milk Test Bottles, 10% in 1/5% div. U. S. Standard	per doz.	3.50
1965E.	Babcock Cream Test Bottles, 6″, 30% in ½% div. U. S. Standard	per doz.	3.50
1965F.	Babcock Cream Test Bottles, 9″, 30% in 1/5% div. U. S. Standard	per doz.	5.15
1965G.	Babcock Skim-milk test bottles, 1/5% in 5/100 div. U. S. Standard	per doz.	9.35

Other Styles Babcock Test Bottles Quoted on Request

Milk pipettes, 17.6 cc., see No. 4464. Cream pipettes, 18 cc., see No. 4465.

1965K.	Electric heater for 8-bottle Babcock Centrifuge	18.75
1965L.	Electric heater for 16 and 24 bottle Babcock Centrifuge	20.50
1965M.	Pillar stand for Electric Hot Water Cup	2.00
1965N.	Electric Hot Water Cup for use with Babcock Centrifuge	12.50

1965/20–1965/33

Laboratory Centrifugal Machine

This laboratory Centrifuge has been developed to meet the need of a small experimental machine for research work. It is specially designed as a self-balancing type of machine with direct-connected electric motor drive. The cast-iron draining chamber has an outlet at the bottom, and the base is cut away to allow a collecting jar to be placed beneath. Outfit consisting of Centrifuge with motor, rheostat, 6″ diam. **porcelain** perforated **basket, porcelain draining chamber,** 4-tube centrifugal head with one set plain glass tubes 10 cc.

1965/20.	110 volts D. C.	**182.00**
1965/21.	220 volts D. C.	**182.00**
1965/22.	110 volts A. C., 60 cycle	**182.00**
1965/23.	220 volts A. C., 60 cycle	**182.00**

Outfit consisting of centrifuge with motor, rheostat, 8″ diam. perforated **bronze basket,** cast-iron draining chamber, 4-tube centrifuge head with one set plain glass tubes 10 cc.

1965/30.	110 volts D. C.	**160.00**
1965/31.	220 volts D. C.	**160.00**
1965/32.	110 volts A. C., 60 cycle	**160.00**
1965/33.	220 volts A. C., 60 cycle	**160.00**

Renewals

1965/20A.	6″ diameter perforated basket	**42.50**
1965/20B.	Porcelain draining chamber for 6″ diam. basket	**23.75**
1965/30C.	8″ diameter bronze perforated basket	**36.00**
1965/20D.	4-tube head and metal tubes, 10 cc., with rubber cushions	**16.00**
1965/20E.	4-tube combination head, two 10 cc., two trunnion cups for crucibles	**18.00**
1965/20F.	Pair hard rubber collars (to be fitted to Gooch crucibles)	**3.50**

1966

1970

Laboratory Centrifuge "Cyclone"

This Centrifuge for experimental purposes is regularly used in well appointed laboratories of chemical and pharmaceutical factories, oil works, dye-houses, technical schools, etc., and by **Sugar Chemists** throughout the world, for determining the yield, as well as the purity, of their products.

With the "Cyclone" Centrifuge, the filling and emptying of the basket and the cleaning of the parts can be effected with great facility. No part has to be unscrewed. The basket and its casing are simply lifted out of the machine and can be replaced instantly.

The basket is made of bronze and balances perfectly. It can be tinned with pure tin at extra cost. **For acid products or where contact with metal has to be avoided, a basket of hard rubber can be supplied at extra cost.**

All the gears of the driving mechanism are cut with the greatest accuracy by special machinery, in order to insure long wear and easy running. Ball bearings are provided to avoid undue friction. The gears are all inclosed in the base, protected against dust. A speed of 3000 to 4000 R. P. M. is obtained without effort.

1966.	**CENTRIFUGE—Laboratory "Cyclone," Type F, 4½"**, Bronze basket, for hand power	**100.00**
1967.	**Ditto**—5" for **hand** power	**110.00**
1968.	**Ditto**—4½" with pulley for **power** drive	**100.00**
1969.	**Ditto**—5" with pulley for **power** drive	**110.00**

Extras

1966A.	For enameling the basket casing	**price on application**
1966B.	For lining the basket casing with hard rubber	**price on application**
1966C.	For tinning the 4½" basket	**price on application**
1966D.	For tinning the 5" basket	**price on application**
1966E.	Hard rubber basket, 4½ inch only	**price on application**
1966F.	Asbestos cloth for the hard rubber basket, ½ doz.	**price on application**
1966G.	Extra pulley for power-drive	**price on application**
1966H.	Extra 4½ inch brass basket	**price on application**
1966I.	Extra 5 inch brass basket	**price on application**
1966K.	For lining the basket casing with lead	**price on application**

1970.	**CENTRIFUGE—Laboratory "Cyclone" Type B, 8"** Bronze basket for hand power.	**150.00**
1972.	**Ditto**—with pulley for power drive	**150.00**

Extras

1970A.	Hard rubber basket, 8"	**price on application**
1970B.	Enameling the basket casing	**price on application**
1970C.	Tinning the 8" basket	**price on application**
1970D.	Lining the casing with hard rubber	**price on application**
1970E.	Pulley for power drive	**price on application**

1973

1973. **CENTRIFUGE—Laboratory "Cyclone," Type E,** with electric motor and bronze basket,, 4½" diameter ..... **price on application**

1973/1. **Ditto**—with bronze basket, 5" diameter ..... **price on application**

Extras

1973A. Hard Rubber Basket, 4½" diameter ..... **price on application**

1973B. For lining basket casing with lead ..... **price on application**

1973C. For enameling the basket casing ..... **price on application**

1973D. For tinning the bronze basket 4½" ..... **price on application**

1973E. For tinning the bronze basket 5" ..... **price on application**

In this machine the transmission is by friction giving the necessary easy start and all variations of speed desired by the operator. As in all other models of the Cyclone type, the basket and its casing can be taken off with ease. The Centrifuge is the most practical, the strongest, and the best built at the present time. The motor is of the G. E. type, 1/15 H. P. 1700 R. P. M. Too much friction slows the speed and may even stop the motor. The friction is regulated by a small lever.

When ordering, do not fail to specify voltage and current, whether direct or alternating. If current is alternating, be sure to specify number of phases and cycles.

1974

1978

1974. **CENTRIFUGE—Electric Milk,** for the Babcock test and general laboratory purposes. A most substantial machine with specially constructed motor and adjusted to accelerate slowly and maintain proper speed for best results. For Direct Current 110 volts.

Size, No. of bottles	8	12	24
Each	**72.00**	**74.50**	**90.00**
1975. **Ditto**—for 220 volts D. C.	**72.00**	**74.50**	**90.00**
1976. **Ditto**—for alternating current 110 volt, 60 cycle	**72.00**	**74.50**	**90.00**
1977. **Ditto**—for 220 volts A. C., 60 cycle	**72.00**	**74.50**	**90.00**

When ordering, do not fail to specify voltage. If current is alternating, specify number of phases and cycles.

1978. **CENTRIFUGE—"20th Century" Noiseless Milk Tester,** for hand power; turns easily and gives accurate results. Enclosed in case as illustrated with necessary glassware and directions.

Size, No. of bottles	8	12	24
Each	**17.00**	**19.00**	**34.50**

BABCOCK MILK BOTTLES—see Milk Analysis.

1979

1979/1

Sharples Laboratory Super-Centrifuge

Awarded the Edward Longstreth Medal of Merit "in Consideration of Separations Effected by this Machine, Impossible Therefore by Mechanical Means."

1979. **CENTRIFUGE—Laboratory, Sharples,** hand driven, for laboratories where steam or compressed air is not available—maximum speed of 25,000 R. P. M. **165.00**

1979/1. **CENTRIFUGE**—Same as above, but with turbine wheel attached to shaft for driving with steam or compressed air at **20** lbs. pressure. With this pressure, the Centrifugal force develops when operated at its maximum speed 40,000 R. P. M. and produces 41,250 times the force of gravity and 2000 times greater than the most efficient tube centrifuge **165.00**

1979/2. **CENTRIFUGE**—Same as 1979, but equipped with a motor suitable for connecting with single phase lighting current, 60 cycles 110 volt A. C. Maximum speed 36,000 R. P. M. **275.00**

1979/3. **Ditto**—220 volt **275.00**

1979A. Above machines especially constructed for use in Medical Laboratories, **Painted White** ..... **extra 11.00**

1979B. Bowl for clarification **27.50**

1979C. Bowl for separation **27.50**

1979D. Extra inner bowl, **Nickel Plated,** to be inserted in regular bowl **11.00**

1979E. Extra inner bowl, **Silver Plated** **16.50**

1979F. Extra inner bowl, **Gold Plated** **22.00**

The Sharples Super-Centrifuge has proven highly successful in solving problems of clarification and separation. With this force extremely obstinate problems of clarification and separation are readily handled. We list here a few of them: Clarification of Agar Agar: Removal of bacteria from water serums and emulsions: Clarification of alcoholic extracts, fruit juices, glue, gelatin varnish, japan, enamel, and vegetable and mineral oil: Removal of corpuscular matter from serum: Dehydration of mineral and vegetable oil emulsions; Dehydration of water gas tar emulsions: Removal of pigment from paint in paint analysis.

2001

2006

2010

2012

1980. **CHAMOIS SKINS—Best Quality,** according to size and dressing.

Size	Baby	Small	Medium	Large
Each	.50	1.00	2.00	2.50

1982. **CHARCOAL—Hardwood,** for blowpiping, ¾x1x4¼ inches ..... dozen 1.15
1984. **CHARCOAL—Artificial,** ½x⅝x3⅜ inches ..... dozen 1.15
1986. **CHARCOAL—Sticks,** for cutting glass ..... dozen 1.00

Lecture Room Wall Charts

1990. **CHART**—Table of the Elements with their Atomic Weights, according to the International Committee. Width 62 inches, length 62 inches, mounted on linen back 5.00
1992. **Ditto**—with wooden rods 6.00
1994. **CHART**—Periodic Arrangement of the Elements, Mendelejeff; arranged up to date with new elements added; mounted on linen back 3.00
1996. **Ditto**—with wooden rods 3.50
2001. **CHIMNEY—Alundum Flame Collar.** This collar differs from the common type in that the refractory mixture will withstand the highest temperatures obtained with laboratory burners. The supporting triangle fits into the slot, holding the crucible in the center of the space, so that a maximum heating effect is produced. Diameter 3½ in., height 3 in. (Support, etc., not included in price.) 3.45
2003. **Ditto**—of clay ..... .50
2004. **CHISELS**—Steel.

Width of face, inches	⅜	½	¾	1
Each	.36	.46	.80	1.40

2004/1. **CITRUS FRUIT (LEMON) SET**—for determining acids and solids in Citrus Fruit Juice.

Set consists of:

1 Brix Hydrometer
1 Chemical Thermometer
1 Volumetric Pipette
1 Burette with Attachment and Support
1 Cylinder
1 Funnel
2 Erlenmeyer Flasks
1 Lemon Squeezer
1 Agateware Cup
1 Dropping Bottle
1 sq. yd. Cheese Cloth
2L standard NaOH solution
2 oz. Sat. Sol. of Phenolphthalein

2006. **CLAMP—Burette,** of iron, with jaws of pressed steel, japanned and rubber covered.... .40
2007. **Ditto**—Of cast iron ..... .55
2008. **Ditto**—Of polished brass ..... .85
2009. **Ditto**—Of polished brass, **nickel plated** 1.00
2010. **CLAMP—Burette,** of iron, with strong spring closing the movable jaw ..... .55
2012. **CLAMP—Burette,** of nickel plated brass, jaws covered with rubber; for attachment to retort stands, etc. ..... .55

2016

2020

2014. **CLAMP—Bunsen,** for attaching to supports by fasteners; round jaws, cork lined; with fastener.

Size	small	medium	large
For	small tubes, burettes, etc.	larger tubes	large tubes and condensers
Each	.75	.65	.80

2016. **Ditto**—without fastener .45 .35 .50

2018. **Ditto**—With V shaped jaws, cork lined; with fastener.

Size	small	medium	large
Each	.75	.65	.80

2020. **Ditto**—without fastener .45 .35 .50

2022

2026

2024

2027

2028

2030

2022. **CLAMP—Burette, Allihn** double; holds the burette firmly, and closes automatically by means of coiled springs 3.85

2024. **CLAMP—Burette,** double, closing automatically by means of coiled springs; jaws rubber covered ..... .80

2026. **CLAMP—Burette, Lincoln,** double; holds the burettes perpendicular and perfectly rigid. Will fit any rod up to ½ inch in diameter 1.25

2027. **CLAMP—Burette,** of wood **"Shift Easy."** Saves time and holds the burette firmly. To change the position, press the button. Elevates, lowers or swings around; attaches to an ordinary ring stand 1.25

2028. **CLAMP—Burette, Hoffman,** double; jaws cork lined ..... .90

2030. **CAMP—Burette,** double, of brass 2.00

2032

2034

2037

2037/2

2032. **CLAMP—Townson,** for condensers and large tubes; of brass, cork lined jaws 3 inches, opening to 2¼ inches; without fastener **1.50**

2034. **CLAMP—E. & A. Universal,** for condensers, etc., with swivel jaws which adapt themselves to irregular shapes, jaws cork lined; without fastener ..... **.70**

2036. **Ditto**—large size, for very large apparatus, condensers, etc., without fastener **1.00**

2037. **CLAMP—Holdawl, small.** Will clamp any object up to 2¼″ diameter. Length—6 inches **1.25**

2037/1. **Ditto—large.** Will clamp any object up to 3¼″ diameter **1.50**

2037/2. **Ditto—adjustable form,** for distances from 1½ to 6 inches **3.00**

2038

2040

2042

2046

2048

2038. **CLAMP—Ostwald Universal,** of brass; will take tubes of all sizes up to 2 inches diameter; without fastener **2.65**

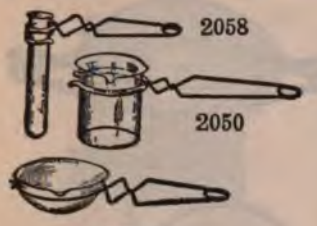
2040. **Ditto—Double,** of brass, with elbow joint; for gas volumeters and other parallel tubes. **2.00**

2042. **CLAMP—Fastener,** for attaching clamps to rods up to $\frac{7}{16}$ inch in diameter ..... **.30**

2044. **Ditto**—for rods up to $\frac{9}{16}$ inch diameter ..... **.35**

2046. **Ditto**—for attaching clamps to rod at any angle ..... **.85**

2048. **CLAMP—Tube,** of nickel plated brass; for screwing into wall, to support tubes, burettes, etc. ..... **.45**


2058
2050
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2060

2062

2066

2068

2070

2050. **CLAMP—Beaker, Chaddock,** spring wire, for holding beakers. Size No. 1B, for beakers Nos. 0 to 2 ..... .25

2052. **Ditto**—Size No. 3B for beakers, Nos. 2 to 4 ..... .25

2054. **CLAMP—Chaddock,** for holding evaporating dishes; size No. 3D, for dishes 3 to 4 inches diameter ..... .25

2056. **Ditto**—Size No. 5D, for dishes 4 to 6 inches diameter ..... .25

2058. **CLAMP—Chaddock,** for holding large test tubes and necks of flasks from ½ to 1½ inches diameter ..... .25

2060. **CLAMP—Crucible,** of brass; for securely holding crucibles and small dishes ..... .80

2062. **CLAMP—Test tube, Stoddart,** of spring wire, nickel plated; small size for tubes up to 1 inch diameter ..... each .10
dozen 1.10

2064. **Ditto**—large size; for tubes ½ to 1½ inches diameter ..... each .25
dozen 2.65

2066. **CLAMP—Test Tube,** of wood, with wire spring ..... each .20
dozen 2.10

2068. **CLAMP—Test Tube, Bunsen,** of brass; for tubes up to ⅞ inch diameter ..... .25

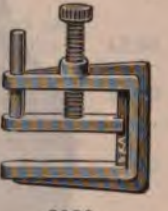
2070. **CLAMP—Wooden,** with spring; for large tubes and flasks ..... .65

2072

2074

2076

2078


2080

2072. **CLAMP—Apparatus,** for holding rods vertical or horizontal, on which to clamp apparatus 1.00

2074. **CLAMP—Table,** of iron for fastening apparatus to the table.

Size of opening, inches ..	2	3	4	6	8	10
Each	.95	1.05	1.45	2.30	3.65	4.75

2076. **CLAMP—Hoffmann Pinchcock,** nickel plated; with screw compressor.

Size	small	medium	large
Opening inches	½x¾	¾x⅞	1½x2¼
Each	.40	.45	1.00
Dozen	4.20	4.80	11.00

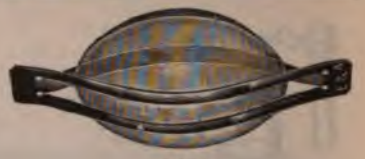
2078. **CLAMP—Hoffmann Improved,** can be attached to tubing without disconnecting apparatus ..... each .28
dozen 2.85

2079. **CLAMP—Hoffmann, Improved, E. & A.,** superior in quality and workmanship to No. 2078 ..... each .55
dozen 6.00

2082

2084

2090


2091

2091/1

2080. **CLAMP—Hoffmann,** another form. For cut see preceding page.

Size	small	large
Opening inches	½x¾	¾x1¼
Each	.30	.32
Dozen	3.20	3.50

2082. **CLAMP—Bunsen,** with screw on each side ..... each **.50**
dozen **5.25**

2084. **CLAMP—Mohr Pinchcock,** nickel plated; durable.

	small	medium	large	extra large	double extra large
Length over all, inches	2⅜	2⅞	3½	3⅞	4 3/16
Each	.13	.15	.18	.30	.40
Dozen	1.40	1.60	1.90	3.35	4.10

2090. **CLAMP—Chaddock Pinchcock,** of one piece of brass wire, nickel plated. A very serviceable clamp, that can be placed on and off the tubing from the side.

Size	small	medium	large	extra large
Each	.12	.15	.18	.25
Dozen	1.20	1.50	1.80	2.50

2091. **CLAMP—Watch Glass,** brass, nickel plated. For watch glasses. Inches 2 2½
Each ..... .20 .25

2091/1. **CLAMP—Watch Glass, Bunsen,** of brass. For watch glasses. Inches .. 2 2½
Each ..... .30 .40

2092

2093

2096

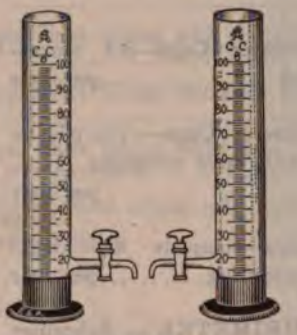
2092. **CLOCK—Interval,** for accurately indicating any interval of time from one quarter minute to two hours. This is of special value to the busy chemist, as a stroke of the bell warns when the set interval of time has expired.
Directions for operation with the clock **4.75**

2093. **CLOCK—The Wizard Reminder;** a new high grade timepiece with computing bezel and precisional **soft** or **loud** alarm, can be set to signal for short intervals with absolute accuracy. The only clock whose signal can be instantly set to ring for any number of hours and minutes of the day and night.
Directions for operation with the clock **6.00**

2093/1. **Ditto**—with Illuminated Hands and Luminous Numerals (clearly discernible in dark).. **7.50**

2096. **COLANDER—Porcelain,** with handle, 6 by 6 inches **4.50**

2102



2108

2110

2112

COLORIMETRIC DETERMINATION APPARATUS

2102. **COLOR COMPARATOR—Camera, improved form;** constructed so that shadows cannot be thrown upon the tubes; mounted on adjustable stand; for 2 carbon tubes.. **12.00**

2108. **COLOR COMPARATOR—Hehner,** for the estimation of iron in water; consists of 2 graduated cylinders with stopcocks and two brass bases .....**per set** **10.00**

2110. **COLOR COMPARATOR—For water analysis;** of wood, painted black outside, inside lined throughout with milk glass plate; for 12 tall form Nessler Jars 50 cc., price without Nessler Jars **4.00**

Nessler jars—see No. 4154.

2112. **COLORIMETER—Campbell-Hurley** (see J. Am. C. S., Vol. XXXIII, 1911, p. 113), widely used for general colorimetric work and of special value in the comparison of the colors of oils and varnishes. With telescope attachment giving a circular divided field; mounted complete, as illustrated **35.00**

With this instrument, a more accurate comparison of colors is made possible than with the camera instruments of this form. Looking through the eyepiece, one observes a single ocular field, divided by an almost imperceptible line when the two solutions are of the same intensity. By manipulating the plunger, the level of the liquid can be easily raised or lowered, thus causing the right half of the image to assume a darker or lighter shade at will.

2112a. Right hand graduated tube with plunger **4.25**

2112b. Left hand graduated tube **1.50**

2114. **COLORIMETER—Duboscq, E. & A. make,** latest form with adjustable cylinders. The observations are made by a monocular telescope, giving a circular divided field, which eliminates the errors incident to the comparison of two separate fields. This is the standard instrument for the determination of total nitrogen in urine, urea in urine, etc., according to the methods of Dr. Otto Folin, Height of tube 5 cm. Instrument is used also very extensively for all kinds of colorimetric work in general laboratories, especially oil, dye, and food laboratories. For cut see next page..... **135.00**

2114

ACCESSORIES FOR DUBOSCQ COLORIMETER NO. 2114. For description see preceding page.

2114a. **Colorimeter Cups**—not mounted .....**per pair** **2.00**

2114b. **Colorimeter Cups**—complete with brass mounting ..... **per pair** **10.00**

2114c. **Plungers**—complete with brass mounting .....**per pair** **20.00**

2116. **COLORIMETER — Schreiner** (see Jour. Am. C. S., Vol. XXVII, Sept., 1905, and U. S. Dept. of Agriculture, Bureau of Soils Bulletin No. 31), complete as illustrated **30.00**

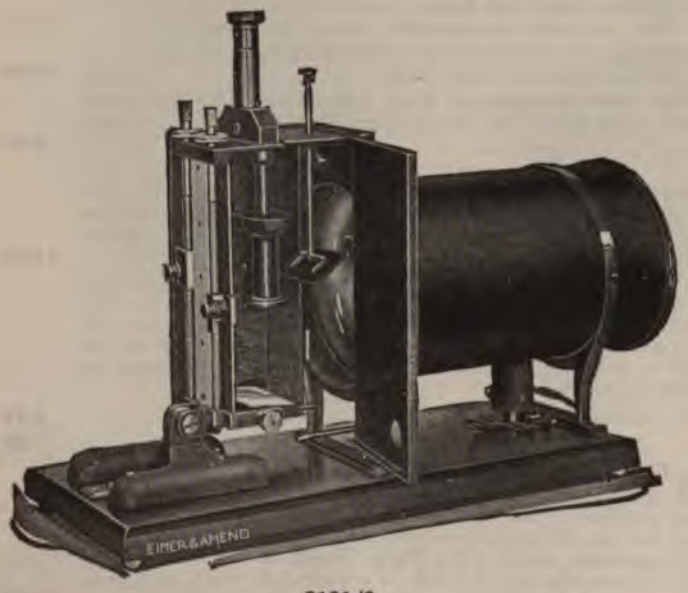
2118. **Extra graduated tubes**..**per pair** **3.00**

2120. **Extra plain tubes** .....**per pair** **.80**

2116

2121/1. **COLORIMETER—Kober,** for making colorimetric and nephelometric tests in chemical and biological work. Fused glass parts, verniers and side by side field adjustable. The instrument with one pair of colorimetric or nephelometric cups and plunger.. **85.00**

2121/2. **KOBER NEPHELOMETER**—with lamphouse, with one pair of short and one pair of long colorimetric cups, one pair of short and one pair of long nephelometric cups, stereopticon lamp cord and plug, mounted on black polished board with switch. This outfit can be used as a colorimeter, as well as a nephelometer by pulling the mirror reflector facing the large condensing lens up and out of the way, thus allowing the parallel light beam from the stereopticon lamp to strike the suspensions contained in the black bottom nephelometric cups **130.00**



2121/2

Accessories for Kober Colorimeter and Nephelometer Described on Preceding Page.

2121/2A.	**Colorimetric Cups,** black tubing with blue bottoms, for use with artificial light, long or short form .....per pair	**5.00**
2121/2B.	**Colorimetric Cups,** black tubing with white bottoms, for use with daylight, long or short form .....per pair	**4.50**
2121/2C.	**Colorimetric Cups,** white tubing with blue bottoms, for use with artificial light, long or short form .....per pair	**4.00**
2121/2D.	**Colorimetric Cups,** white tubing with white bottoms, for use with daylight or artificial light, long or short form .....per pair	**3.50**
2121/2E.	**Nephelometric Cups,** white tubing with black bottoms, long or short form .per pair	**4.50**
2121/2F.	**Concentrated filament lamp**	**1.75**
2121/2G.	**Plungers** .....per pair	**4.50**
2121/2H.	**Zero gauge**	**.60**

2121/3

2121/4

2121/3.	**COLORIMETER—Bock-Benedict,** simple in construction and highly accurate, complete instrument, ready for work, with plunger, cup for the unknown and cell for the standard, with directions for use	**40.00**
2121/3A.	**Extra plungers** ..... each	**1.15**
2121/3B.	**Extra cups** ..... each	**1.15**
2121/3C.	**Extra cells** (8x10 mm. or 15x20 mm.) ..... each	**2.30**
2121/4.	**COLORIMETER—Dr. Myers,** an improved, simple, inexpensive instrument for clinical purposes; for determining phenolsulphonephthalein, uric acid, nitrogen in the form of ammonium sulfate or chloride, creatinine as well as glucose in saturated picric acid solution; made of japanned brass instead of old wooden type, with directions	**15.00**
2121/4A.	**Extra Test Tubes** .....per pair	**4.00**
2121/5.	**COLORIMETER—Saybolt,** so-called **"UNIVERSAL CHROMOMETER."** for determininig the color shades of refined petroleum. The instrument is arranged with upright removable glass tubes, one graduated tube, in which is the material to be tested, and one similar ungraduated tube, into which the two color glasses are adjusted. A prismatic eyepiece brings the two tubes into single eye vision. Complete in carrying case. For cut, see next page	**80.00**

Directions for use supplied with instrument.

2122

2121/5

2136

2132

2122. **COLORIMETER—Stammer,** latest improved form, for comparative color tests in sugar analysis, etc. **120.00**

2132. **COLORIMETER—U. S. Geological Survey, Standard Outfit,** for color and turbidity measurements.

The set consists of 4 aluminum tubes and 6 standard discs of amber colored glass mounted in aluminum. The standard tube with clips is for holding the discs. The other tubes, one each 200, 100 and 50 mm. long are for the water to be tested. In morocco covered case, complete **49.50**

These color tubes and discs, which conform to the recommendations of the U. S. Geological Survey, are based on the platinum-cobalt method of color measurements. This method consists of comparing the color of the given water with that of standard scale. Each solution bears a number which corresponds to the metallic platinum in parts per million in that solution. As it is impractical to carry around these standards, a series of colored glass discs, rated in color values according to the platinum-cobalt scale, are used. Thus a disc of value 70 is the same color as a standard solution containing 70 parts of platinum in a million.

2134. **Ditto**—with Turbidity Scale No. 2136, in morocco covered case, complete **56.00**

2136. **TURBIDITY SCALE—U. S. Geological Survey Standard.** For determining the degree of turbidity of water. Made of aluminum 8 inches long, graduated; with 4 foot non-stretchable tape also graduated **9.00**

Lovibond Tintometer

An instrument by which the depth of color in liquids and solids can be accurately measured in degrees, placed in their position in a permament color scale, and registered for reproduction at any time.

It consists of a graded series of standard colored glasses, numbered according to their depth of color, and an instrument for holding the glasses and the object to be measured.

FOR CUTS AND FURTHER PARTICULARS SEE FOLLOWING PAGES

2138

2151

LOVIBOND TINTOMETER—Continued.

2138. **COLORIMETER—Lovibond Tintometer.** The Optical Instrument only, improved form; combined monocular and binocular, leather covered, on stand **32.50**

2140. **Standard Color Glasses.** Red, Yellow, Blue, and Amber .....each **2.25**

2140/1. **A complete set** of Standard Glasses, for matching all colors, 470 glasses ..... **price on application**

2140/2. **Trays** for Powders and **Blocks** for Fabrics .....each **.50**

2140/3. **"Presser"** for pressing powders evenly into trays **2.00**

2140/4. **Strong Polished Box,** to contain sets .....price on application

2142. **Gauge Metal Troughs,** with glass ends, brass or silver plated.

Inches	1/16	1/8	1/4	1/2	1	2
Each	6.50	6.50	6.50	6.50	7.50	8.50
Inches	6	8	9	12	18	24
Each	11.50	11.50	11.50	16.00	19.00	19.00

2146. **Capillary Film Holder,** with platinum gauges from 1/50 to 1/100 inch thickness **25.00**

2147. Book—"The Teachers' Handbook of Color," by Joseph W. Lovibond ..... **.50**

2148. Book—"The Measurement of Light and Color Sensations," by J. W. Lovibond **3.25**

2149. Book—"Light and Color Theories," by Joseph W. Lovibond **3.25**

2150. Book—"An Introduction to the Study of Color Phenomena," by J. W. Lovibond **3.25**

2151. **COLORIMETER—Lovibond Tintometer.** Set of apparatus for Dyers and Printers, applicable to liquids and solids, including the improved monocular and binocular Optical Instrument, 5 vulcanite and 5 silvered cells from 1 in. to 1/16 in., trays and presser for powders, 6 blocks with pins for fabrics, standard white, without standard glasses, polished box with stand and reflector **110.00**

2152. **SET NO. 2.**—Tintometer set of Apparatus for Fabrics and Solids only, including the improved Optical Instrument, box with stand and reflector, trays, blocks, pressers, standard white; without standard glasses **53.00**

2154. **SET NO. 3A.**—Tintometer set of Apparatus for Brewers, Malsters, Sugar and Caramel Manufacturers, Wine and Spirit Merchants, including the Improved Optical Instrument, box with stand and reflector, 1 inch and 1/16 inch silvered cells, filtering apparatus, and 20 standard glasses, series 52 and 50 ..... **78.00**

2174

2178

LOVIBOND TINTOMETER—Continued.

2156. **Extra Apparatus** for estimating the color of dry malt, 33 standard glasses, with trays, presser and standard white **36.00**

2157. **Lamp** for testing beer and malt by artificial light for above **13.00**

2158. **SET NO. 5A.**—Tintometer set for Estimating Percentage of Ammonia, in Nessler Ammonia Test, including the Improved monocular and binocular Optical Instrument, box with stand and reflector, ½ inch glass cell, with 30 standard glasses **100.00**

2160. **SET NO. 5B.**—Tintometer set for Estimating Carbon in Steel, including the Improved Optical Instrument, box with stand and reflector, ½ inch glass cell, and 34 standard glasses series 52, and 26 glasses series 50 ..... **135.00**

2162. **SET NO. 6A.**—Tintometer set for Estimating the Color in Oils, Waxes, Lards and other Fats, Varnishes, Gelatines, Scale, and other similar substances, including the Improved Optical Instrument, fitted with hot-water apparatus for melting solids, with thermometer for taking their melting-point, box, 1 inch, ½ inch, ¼ inch silvered cells, without standard glasses **84.00**

2164. **SET NO. 6B.**—Tintometer set for Estimating the Color in Cotton Seed Oil, including the Improved Optical Instrument, fitted with lamp and hot-water apparatus for liquefying the oil and maintaining a given temperature, 5¼ inch cell, and 36 standard glasses **118.00**

2166. **SET NO. 7.**—Tintometer set for Standardizing Merchantable Petroleum, including the Monocular Optical Instrument, box with stand and reflector, 18 inch cell (silvered), 4 special standard glasses for water white, standard white, superfine white, and prime white **65.00**

2168. **Additional Apparatus** for Intermediate, Russian, and Lubricating Oils, including $\frac{1}{16}$ inch silvered cell and 5 additional standards **21.00**

2169. **SET NO. 8.**—An Investigator's Laboratory set for all purposes, including the Monocular Optical Instrument, in plain box, with stands and reflector, 24 in. and 12 in. brass cells, 2 in., 1 in., ½ in., ¼ in., ⅛ in., $\frac{1}{16}$ in. silvered; and 1 in., ½ in., ¼ in., ⅛ in., vulcanite cells, 6 blocks, 6 trays, presser for powder, standard white, shoe for opaque work, and filtering apparatus, without standard glasses **168.00**

2170. **SET NO. 9.**—Tintometer set for Estimating the Value of Flour, including the Improved Optical Instrument, standard white, 6 trays, pressing apparatus, and 90 standard glasses **132.00**

2172. **SET NO. 10.**—Tintometer set for Estimating the Color Matter in Tannin Solutions, consisting of Improved Instrument in polished box, with stand and reflector, .5 cm. and 1.0 cm. glass cells, and 88 standard glasses **168.00**

2180

2182

2184

2186

2190

LOVIBOND TINTOMETER—Continued.

2173. **SET NO. 12.**—Educational set or Color Educator. An apparatus for teaching color in schools, consisting of a frame with six apertures for the standard glasses, 27 standard colors, white plate for dealing with opaque colors, colored diagrams for illustration and handbook of instructions **18.00**

2174. **COLORIMETER—Wesson type,** simple form improved. This apparatus is especially devised for reading the color of Vegetable Oils by means of Lovibond Tintometer glasses. The oil is placed in a special glass tube. The apparatus is devised so that the centers of two discs of color are ¾" apart instead of 1½". Complete with two special tubes and with Lovibond compound standard glass, yellow 35 + red 7.1 or any other compound or 2 other single standard color glasses. For cut see preceding page **16.50**

2178. **COLORIMETER—Wesson type,** monocular, for Estimating the Color in Cotton Seed Oil, with prism and magnifying ocular placing fields side by side; fitted with special glass tube and compound standard glass yellow 35 + red 7.1 or any other compound or 2 other single standard color glasses. For cut see preceding page **62.50**

2179. **Set of 22** standard Lovibond glasses for use with instruments 2174 or 2178 ..... **49.50**

2180. **COLOR—Tube of glass,** for water analysis; 24 inches long, about 2 inches diameter, each end fitted with a heavy glass plate **5.50**

2182. **COLOR—Tube of Brass,** 25 inches long, 2½ inches diameter, closed at the ends by discs of plate glass ¼ inch thick, held in place by screw caps. Easily cleaned; very desirable **18.00**

2184. **COLOR—Comparison Tubes, Eggertz,** for the colorimetric estimation of carbon and manganese in steel.

Capacity, cc.	10	25	30	50	50	100
Subdivisions	1/10	1/10	1/10	1/5	1/10	1/5
Set of two	**2.00**	**2.10**	**2.60**	**2.60**	**3.00**	**3.00**
Set of four	**4.40**	**4.60**	**5.70**	**5.70**	**6.60**	**7.70**

2186. **COLOR—Comparison Tubes, Eggertz (Julian),** with ends bent, lower portion ungraduated.

Capacity, from, cc.	5 to 25	5 to 30	10 to 50	10 to 50	10 to 70
Subdivisions	1/10	1/10	1/5	1/10	½
Set of two	**2.25**	**2.75**	**2.75**	**3.00**	**3.50**
Set of four	**5.00**	**6.00**	**6.00**	**6.60**	**7.70**

2190. **COLOR—Comparison Tubes, Camp,** for determining manganese in steel, set of two graduated, larger tube stoppered **6.50**

Color-Comparison Tubes, Nessler Jars, see Jars.

Color-Comparison Tubes, Jackson Turbidimeter, see Sulfur.

Color-Test Tube, see No. 7224.

2195

Fleming Combustion Apparatus

The Fleming method for the determination of carbon in all grades of steel by direct combustion is considered by many the most rapid, accurate and simple of the several well-known methods in use.

The method is of special value for determining carbon in bath tests, also in routine work. A complete determination can easily be finished within ten minutes; only five minutes are required for the combustion proper (from connecting to disconnecting of the Absorption Tube).

The special Absorption Tube is considered the most efficient ever devised. There is no possibility of CO_2 or moisture escaping, even though the oxygen current passes at the high rate of 600 cubic centimeters per minute. One proper filling of the absorption tube will last for seventy-five combustions.

Booklet descriptive of the method, sent upon application.

2195. **COMBUSTION APPARATUS—Fleming.** complete as illustrated without rheostat, with **Multiple Unit** Electric Combustion Furnace, one piece Fleming bulb, rubber stoppers, glass and rubber connections; without oxygen tank and pressure gauge... **52.50**

2197. **Ditto**—with rheostat for regulating temperature of furnace **64.50**

When ordering state voltage of current available.

Separate Parts

K.	Mercury Pressure Gauge	**2.00**
P.	Washing Bottle	**1.50**
T.	Calcium Chloride Jar	**1.40**
G.	Mercury Valve	**.75**
S.	Silica Tube 30 inches long ⅞ inch inside diameter	**5.75**
F.	Multiple Unit Electric Combustion Furnace No. 3359	**30.00**
Z.	Zinc Jar	**.75**
C.	Stopcock	**2.00**
O.	Phosphoric Anhydride Jar	**2.75**
W.	Fleming Absorption Tube No. 1271	**3.50**
W1.	Fleming Martin Absorption Tube No. 1271/1	**5.00**
W2.	Fleming Patented Absorption Tube (description given under No. 1271/2)	**7.50**
P1.	Washing Bottle	**1.50**
M.	Connecting Tubes .....per set	**1.50**

Accessories

2199. **Vitrified Clay Combustion Tube,** complete with clay connector and rubber sleeve, Tube 23½" long, ¾" bore, connector 5" long (see illustration No. 2215) **9.50**

2203. **Ditto**—without clay and rubber connection **5.75**

2205. **Alundum Boats,** 3½x½ inches ..... **.35**

2207. **Nickel Boats,** 3x½ inches **1.00**
"RR" Alundum, 30, 46 and 60 mesh, **blue label** .....per pound **1.75**
Special Soda Lime, containing 2 per cent. moisture; 20, 40 and 60 mesh .....per pound **.40**

2209. **Regulating and Reducing Gauge,** 3000-pound gauge on inlet, gauge on outlet, with universal fitting for any oxygen tank **38.50**

2213 2215

2213. **COMBUSTION APPARATUS—C. M. Johnson.** Used extensively for the determination of carbon in iron, steel, ferro alloys and plumbago. A single combustion including all operations can be executed in 25 minutes. Train complete, with connections and Multiple Unit Electric Combustion Furnace, but without rheostat... **48.00**

2214. **Ditto**—Complete with rheostat **60.00**
When ordering state voltage of current available.

Separate Parts

a.	Mercury Pressure Gauge, for detection of leaks and stoppages	**1.20**
b.	Jar, for Stick Potassium Hydroxide, or for any solid dryer or absorbent	**1.40**
c.	Safety Jar, for Potassium Hydroxide Solution, preventing solution from backing over into rubber tubing	**1.75**
d.	Calcium Chloride Jar	**1.50**
e.	Soda Lime Jar	**1.40**
f.	Mercury Valve, to prevent reverse action	**.75**
g.	Electric Combustion Furnace, Multiple Unit, No. 77	**30.00**
g1.	Fused Silica Combustion Tube, for above furnace, 30 inches long, ⅞ inch bore..	**5.75**
h.	Jar for Granular Zinc, to remove acid and chlorine fumes	**.80**
i.	Jar for Phosphoric Anhydride to remove water	**.75**
j.	Absorbent and Weighing Apparatus for CO_2	**1.35**
k.	Connecting Tubes .....set	**1.50**

2215. **VITRIFIED CLAY COMBUSTION TUBE**—complete with clay connector and rubber sleeve; tube 23½" long, ¾" bore, connector 5" long **9.50**

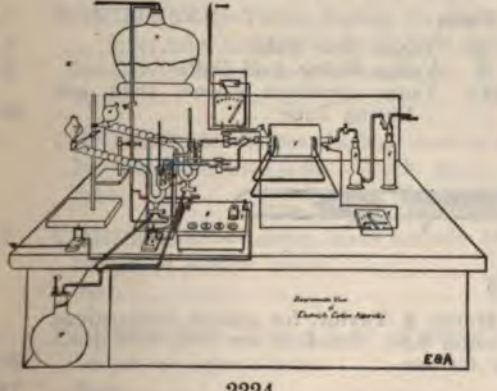
2217. **Ditto**—without clay and rubber connection **5.75**

2219. **ALUNDUM COMBUSTION BOATS**—for use with above ..... **.35**

2221. **COMBUSTION BOATS—C. M. Johnson,** of vitrified clay. Size 120x15 mm. See No. 860.

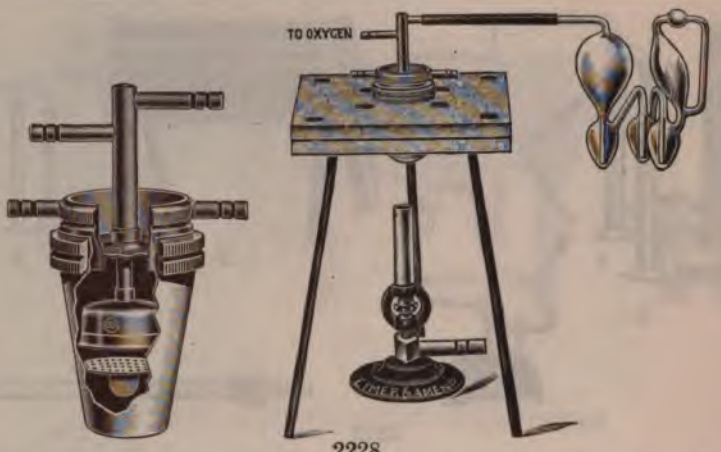
2223. "Rapid Methods for the Chemical Analysis of Special Steels, Steel Making Alloys, and Graphite," by C. M. Johnson, in which the above determination is described..... **3.00**

For Johnson Milling Machine for obtaining steel samples, see No. 4472.



2224

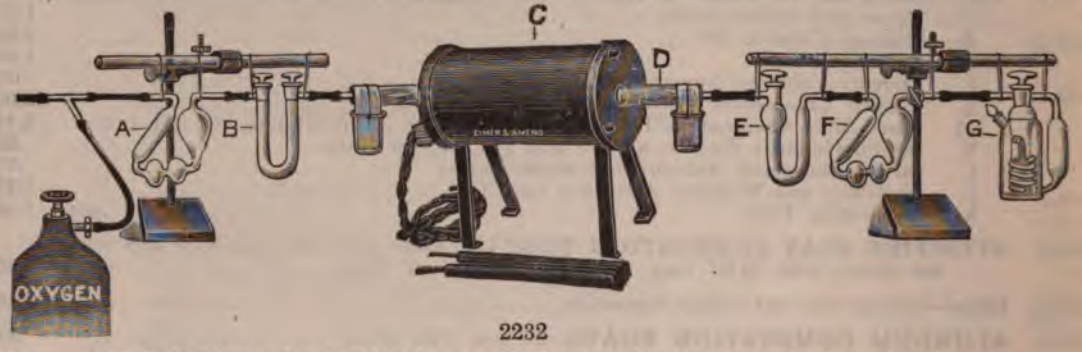
2224. **COMBUSTION APPARATUS**—for the determination of Carbon in Steel according to J. R. Cain and L. C. Maxwell, Jour. of Ind. & Eng. Chem., Sept., 1919. The amount of CO_2 is determined by absorbing it in $Ba(OH)_2$ solution, and measuring the resistance change of the solution in relation to its concentration. Determination can be made in 4½ to 5 min., accurate to within .01% C. ..... **price on application**



2228

2228. **COMBUSTION APPARATUS—Eimer, for the determination of Carbon in Iron, Steel, etc.** The crucible (of platinum or nickel) is provided with a well ground stopper which fits accurately at all times, as the top edge of the crucible is kept in perfect shape by means of a heavy metallic ring on the outside. The upper part of the stopper serves as a water cooler, dispensing with the usual cumbersome devices. A special copper oxide chamber (platinum or nickel) through which the gases pass slowly, ensuring perfect combustion, is attached to the lower end of the stopper. The incoming oxygen is superheated, by being forced to pass around the heated copper oxide chamber.

Apparatus as above, with conical shape **nickel** crucible, 50 cc. capacity; one iron tripod with asbestos protection plate; drying tube and potash bulb **37.50**



2232

2232. **COMBUSTION APPARATUS—G. P. Vanier,** for the determination of carbon in steel by the direct combustion method. Complete as illustrated, with Multiple Unit electric furnace, silica tube 30 inch, etc., without aspirator bottles, oxygen Cylinder and rheostat **57.50**

2232/1. **Ditto**—complete with rheostat **69.50**

Separate Parts

A.	Potash Bulb	**.60**	E.	Vanier Zinc Tube	**1.25**
B.	Calcium Chloride Tube	**1.75**	F.	Vanier Sulfur Acid Bulb	**2.60**
C.	Electric Combustion Furnace	**30.00**	G.	Vanier combined Potash Bulb and Drying Tube	**10.00**
D.	Fused Silica Combustion Tube	**5.75**			

2233

2233. **COMBUSTION APPARATUS—Electric, Morse & Taylor,** for organic combustions. The apparatus consists of a glass combustion tube, closed at one end, with platinum spiral, complete as illustrated, ready for use **20.00**

2233/1. **Ditto**—with tube, both ends open **22.00**

COMBUSTION BOATS—See Boats.
COMBUSTION FURNACES—See Furnaces.
COMBUSTION INDICATOR—See Gas.
COMBUSTION SPOONS—See Spoons.
COMBUSTION TUBES—See Tubes.

2235

2237

2238–39

2240–41

2243–43/1

2235. **COMPASS—magnetic,** black-bronzed brass case, fitted with ring, heavy enamelled card dial accurately divided in 50 divisions, flat needle, jeweled centre, and beveled glass crystal ..... **.50**

2237. **COMPASS—U. S. Army,** thin model, white metal hunter case, strongly hinged, beveled glass crystal, automatic stop lift, silvered metal dial, jeweled-bar needle with luminous points. Packed each in box **3.25**

COMPRESSION PUMPS—see Pumps.

Condensers

2238. **CONDENSER—Liebig,** glass jacket and tube, with rubber connections; inner tube drawn out at end as an adapter.

Length of jacket, inches	10	12	15	20	25	30	40
Each	**.90**	**1.00**	**1.10**	**1.25**	**1.60**	**2.00**	**3.20**

2239. **CONDENSER—Liebig,** same as above, made of **Pyrex** glass.

Length of jacket, inches	10	12	20	24
Each	**2.40**	**2.60**	**3.60**	**4.00**

2240. **CONDENSER—Tubes, Liebig,** for above condensers, with end drawn out as an adapter, inner tube approximately ½ inch diameter.

For Condenser with jacket; length, in.	10	12	15	20	25	30	40
Each	**.20**	**.25**	**.32**	**.40**	**.50**	**.60**	**.75**

2241. **CONDENSER—Tubes, Liebig,** same as above, made of **Pyrex** glass.

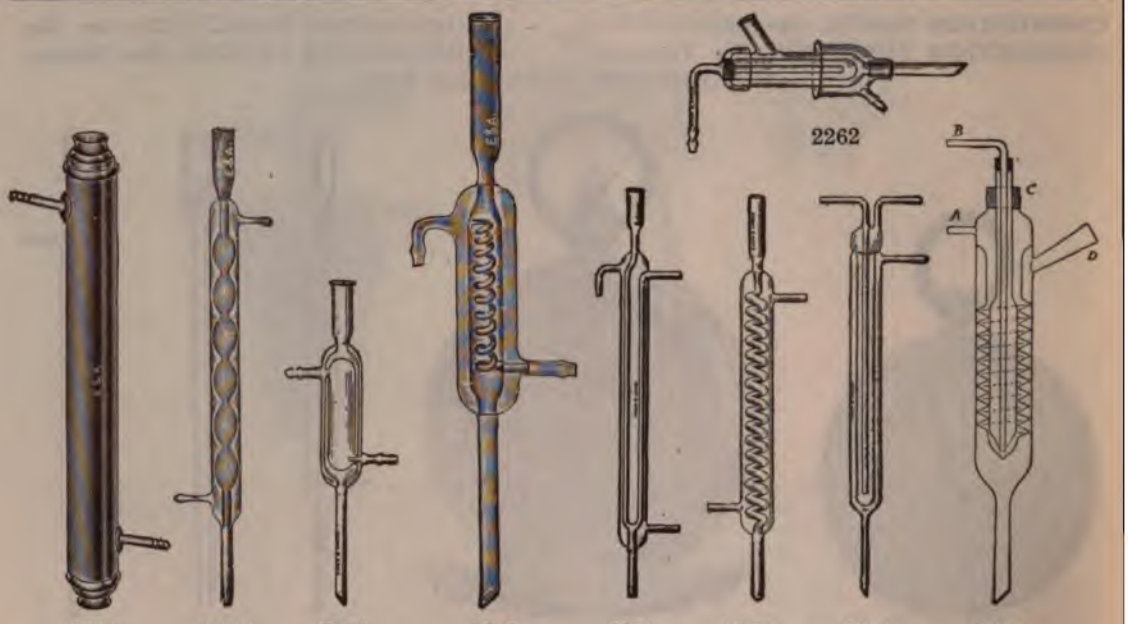
For Condenser with jacket; length, in.	10	12	20	24
Each	**.50**	**.60**	**.80**	**1.00**

2243. **CONDENSER—Liebig,** made entirely of glass, with inner tube sealed in the jacket.

Length of jacket; inches	8	10	12	15	20	25	30
Each	**.90**	**.100**	**1.10**	**1.25**	**1.60**	**1.80**	**2.25**

2243/1. **CONDENSER—Liebig,** same as above, made of **Pyrex** glass.

Length of jacket; inches	10	12	20	24
Each	**2.80**	**3.20**	**4.40**	**4.80**



2244 2246 2248 2249 2250 2252 2254 2256

2244. **CONDENSER—Liebig,** brass jacket with inner tube of glass, fitted with rubber stoppers.

Length of jacket; inches	15	20	30	40
Each	**4.00**	**4.60**	**6.10**	**8.00**

2246. **CONDENSER—Allihn,** made entirely of glass; inner tube with bulbs sealed in the jacket.

Length of jacket; inches	8	10	12	15	18	25	30
Each	**1.20**	**1.40**	**1.55**	**1.80**	**2.10**	**2.60**	**4.00**

Can also be supplied in Pyrex glass—Prices on application.

2248. **CONDENSER—Davies improved.** A double surface condenser. The outflowing warm water does not in the least heat the inflowing water.

Length of jacket; inches	6	8	12
Each	**7.50**	**8.10**	**9.30**

Can also be supplied in Pyrex glass—Prices on application.

2249. **CONDENSER—Kobe, Improved double surface** with body 6 inches long, for most purposes as efficient as a regular Liebig Condenser 35 to 40″ long. Used to advantage as a reflux, being in this respect like an Allihn, but more efficient **6.00**

Can also be supplied in Pyrex glass—Prices on application.

2250. **CONDENSER—Goeckel,** of glass; especially adapted for the distillation of inflammable substances, leading off dangerous gases, and for use as a reflux condenser.

Length of jacket; inches	18	24
Each	**3.00**	**3.60**

2252. **CONDENSER—Graham,** made entirely of glass, with spiral inner tube sealed to jacket for rapid condensation.

Length of jacket; inches	6	8	12	15	18	25	30
Each	**1.60**	**1.90**	**2.75**	**3.30**	**4.20**	**6.00**	**9.00**

Can also be supplied in Pyrex glass—Prices on application.

2254. **CONDENSER—Hopkin Reflux,** of glass, total length 14 inches; very popular for use with extraction apparatus **2.00**

Can also be supplied in Pyrex glass—Prices on application.

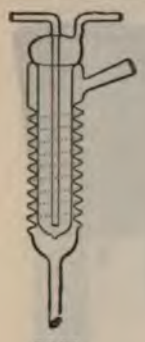
2256. **CONDENSER—Friedrich Reflux.** A most efficient condenser constructed so that the outflowing warm water does not raise the temperature of the inflowing water. The condenser is readily taken apart; when setting up "A" is connected with the water supply, "B" to the sink, and the stopper "C" is raised to allow the escape of air. Tube "D" is so arranged that the condenser can be used for distillation; in that case the water must enter at "B" and flow off at "A" **10.00**

2260. **CONDENSER—Glass Worm,** with outer glass vessel.

Capacity of outer vessel, pints	1	2	4
Complete, each	**3.50**	**4.50**	**6.00**

2262. **CONDENSER—Cribb,** double surface, of glass; size 4¾x1⅛; will condense 1 liter of water per hour **4.50**

2264. **CONDENSER—Cribb,** of heavy copper; will condense water at three or four times the rate of the glass condenser **7.5**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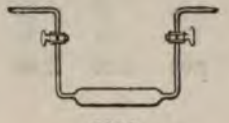
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2281/1

2274

2266. **CONDENSER—Friedrich.** This condenser is more efficient than the regular kind of three times the size. The light blown glass screw 10 cm. long, having 10 turns of about 4 cm. diameter, forming a spiral through which the rising vapor is compelled to pass **7.00**

2268. **Ditto—With cork stopper,** for high boiling point distillates **5.50**

2270. **CONDENSER—Soxhlet,** ball shape; of copper nickel plated, tinned inside; 4 inches diameter **4.00**

2271. **Ditto—With two bulbs,** of copper nickel plated, tinned inside, 4 inches diameter **10.50**

2272. **CONDENSER—Soxhlet,** ball shape; of glass, 4 inches diameter **8.00**

2274. **CONDENSER—Storch,** of copper nickel plated; especially desirable for use with extractors, as no stopper is required **2.00**

2276. **CONDENSER—Hallock,** of copper, with heavy block tin spiral tube, and two rods for attaching to support; size 14½x4 inches **9.65**

2278. **CONDENSER—Zinc,** with heavy block tin worm.

Capacity, gallons	½	1	2	3	5
Each	**7.50**	**9.25**	**12.00**	**15.00**	**19.50**

2280. **CONDENSER—Fisher,** for sulfurous acid; with stopcock on vertical tubes **4.50**

CONDENSER—Wiley, see Extraction apparatus.

CONDUCTIVITY CELLS, see under Physico-Chemical Apparatus.

2281. **CONE**—for filtering, made of nickel, profusely perforated, size 1½ in. diameter **3.70**

2281/1. **CONE—best American Porcelain, Coors make,** glazed with exception of rim, with holes about 1 mm. diameter.
Size 3, Diameter 50 mm., height 43 mm. **1.08**
Size 4, Diameter 63 mm., height 62 mm. **1.32**

CONES—Filter, see No. 5041.

CONES—Platinum, see No. 5324.

1 2 3 4 5 6 7 8

2282–4

No. 1 to 8—actual sizes

2282. **CORKS—Excelsior Brand.** Regular length.

No.	0	1	2	3	4	5
Diam. at small end; inches	¼—	¼+	5/16	⅜	7/16	½
Gross	**.25**	**.26**	**.27**	**.33**	**.36**	**.42**
No.	6	7	8	9	10	11
Diam. at small end; inches	9/16	⅝	21/32	11/16	¾	13/16
Gross	**.46**	**.52**	**.62**	**.74**	**.80**	**.90**
No.	12	13	14	15	16	17
Diam. at small end; inches	⅞	15/16	1	1 1/16	1⅛	1 3/16
Gross	**.95**	**1.05**	**1.20**	**1.40**	**1.70**	**1.85**
No.	18	19	20	22	24	26
Diam. at small end; inches	1¼	1 5/16	1⅜	1½	1⅝	1¾
Gross	**2.00**	**2.20**	**2.40**	**2.95**	**3.50**	**4.30**

2282/1. **CORKS—Assorted,** Nos. 1–20 .....per gross 1.25

2284. **CORKS—XXXX Quality,** highest grade; especially selected for the most exacting laboratory requirements.

No.	1	2	3	4	5
Diam. at small end; inches	21/64	25/64	27/64	15/32	33/64
Gross	**.33**	**.42**	**.45**	**.56**	**.66**
No.	6	7	8	9	10
Diam. at small end; inches	37/64	41/64	43/64	47/64	25/32
Gross	**.74**	**.90**	**1.15**	**1.40**	**1.60**
No.	11	12	13	14	15
Diam. at small end; inches	13/16	⅞	15/16	1	1 1/16
Gross	**1.70**	**1.90**	**2.10**	**2.40**	**2.75**
No.	16	17	18	19	20
Diam. at small end; inches	1⅛	1 3/16	1¼	1 5/16	1⅜
Gross	**3.40**	**3.70**	**4.00**	**4.30**	**4.60**

2284/1. **CORKS—Assorted,** Nos. 1–20 .....per gross 2—2

2286. **CORKS—XXX Quality, Flat,** for wide mouth bottles.

Diameter at large end; inches	1	1⅛	1¼	1⅜	1½	1⅝	1¾
Dozen	**.17**	**.21**	**.25**	**.31**	**.36**	**.42**	**.48**
Gross	**1.70**	**2.10**	**2.50**	**3.10**	**3.60**	**4.20**	**4.85**
Diameter at large end; inches	1⅞	2	2⅛	2¼	2½	2⅝	2¾
Dozen	**.56**	**.65**	**.75**	**.90**	**1.13**	**1.30**	**1.48**
Gross	**5.65**	**6.55**	**7.55**	**9.00**	**11.35**	**13.00**	**14.80**
Diameter at large end; inches		3	3½	4	4½	5	6
Dozen		**1.83**	**2.79**	**3.75**	**5.50**	**6.75**	**10.50**
Gross		**18.30**	**27.90**	**37.50**	**55.00**	**67.50**	**105.00**

2286/1. **CORKS—Assorted,** 1" to 2½" .....per gross 5.

CORKS—Rubber, see Rubber stoppers.

2309

2313

2328

Crucibles

2309. CRUCIBLE—Best American make, hard burned, Clay, for assaying, Battersea round form, identical in appearance and size to the imported, but superior in quality.

No.	F	G	H
Height, in.	5	5⅝	5⅞
Diameter, in.	3⅛	3⅜	3¾
Orig. bbls. approx.	175	100	100
Dozen	**2.40**	**3.36**	**4.10**
Orig. bbls. per 100	**18.00**	**25.00**	**31.00**
Covers, per doz.	**1.68**	**1.92**	**2.16**

2311. CRUCIBLE—Best American make, hard burned, Clay, round form.

No.	DD	EE	FF	GG	HH	II	JJ
Height, in.	2¾	3⅜	3½	4½	4¾	5¼	5¾
Diameter, in.	2	2¾	2⅞	3⅛	3⅝	4⅜	4⅞
In boxes of	100	100	100	...	...	...	...
Orig. bbls .approx.	700	400	325	200	150	100	70
Dozen	**1.68**	**2.16**	**2.64**	**3.12**	**4.10**	**6.00**	**8.40**
Orig. bbls. per 100	**12.50**	**16.25**	**20.00**	**23.40**	**30.50**	**45.00**	**63.00**
Covers, per doz.	**.96**	**1.20**	**1.44**	**1.68**	**1.92**	**2.16**	**2.64**

No.	KK	LL	NN	OO	XX
Height, in.	7	7½	8¾	11¼	12¾
Diameter, in.	5¾	6	6¾	8⅜	9½
Orig. bbls. approx.	45	34	24	10	5
Dozen	**10.80**	**14.40**	**21.60**	**39.00**	**66.00**
Orig. bbls. per 100	**81.00**	**108.00**	**162.00**	**295.00**	**500.00**
Covers, per doz.	**2.88**	**3.36**	**4.80**	**7.20**	**9.60**

2313. CRUCIBLE—Best American make, hard burned, Clay, triangular form.

No.	1	2	2½	3	4	5	6	7
Height, in.	2¼	3½	3½	4	4¾	5¼	6	7
Diameter, in.	2	2½	2½	2⅞	3¼	3⅞	4⅞	6⅛
Orig. bbls. approx.	800	600	400	300	150	125	60	30
Dozen	**1.92**	**2.16**	**2.64**	**2.88**	**4.80**	**5.50**	**10.30**	**14.40**
Orig. bbls. per 100	**14.40**	**16.20**	**19.80**	**21.60**	**36.00**	**41.40**	**77.40**	**108.00**
Covers, per doz.	**.96**	**1.20**	**1.44**	**1.68**	**1.92**	**2.40**	**2.88**	**3.36**

2314. CRUCIBLE—Clay, Denver, round form.

No.	D	E	F	G	I	J	K	L	N	O	Q
Hgt., in.	4	4½	5	5⅝	6	6⅝	7¼	8	9¼	10	13
Dia., in.	2½	3	3⅛	3⅜	4	4⅜	4⅝	5¼	6½	7⅛	9
Org. bls. approx.	500	350	300	200	150	150	75	50	35	28	18
Doz.	**.90**	**1.45**	**1.80**	**2.20**	**2.65**	**3.85**	**4.85**	**9.00**	**15.00**	**19.30**	**39.40**
Org. bls. per 100	**6.60**	**10.30**	**12.85**	**16.00**	**19.25**	**28.00**	**35.00**	**65.00**	**108.00**	**140.00**	**285.00**
Cov., dz.	**.55**	**.85**	**1.10**	**1.30**	**1.60**	**2.00**	**2.20**	**2.30**	**3.50**	**4.10**	**5.35**

2316. CRUCIBLE—Clay, Denver, Colorado form, for lead.

Capacity, grams	5	10	15	20	30
Orig. bbls. approx	900	550	400	350	300
Dozen	**.65**	**.80**	**.90**	**1.05**	**1.60**
Orig. bbls. per 100	**4.50**	**5.60**	**6.60**	**7.60**	**11.50**
Covers, per doz.	**.55**	**.55**	**.65**	**.85**	**1.30**

2318. **CRUCIBLE—Clay, Denver, French form.**

No.	6	8	9
Height, inches	4	5	5¾
Diameter, inches	2¼	2½	3
Dozen	.90	1.80	2.25
Orig. bbls. per 100	6.60	13.00	16.50

2328. **CRUCIBLE—Black Lead, Dixon.** For cut, see preceding page.

No.	0	00	000	0000	1	2	3	4	5	6	7
Height, inches	2	2⅜	2½	3	3⅝	4½	5¼	5⅝	6	6¼	6¾
Diameter, inches	1½	1⅞	1⅞	2⅜	3⅛	3¾	4¼	4⅝	4⅞	5¼	5½
Each	.75	.75	.75	.75	1.00	1.10	1.30	1.60	2.00	2.35	2.60
Covers, each	.35	.35	.35	.35	.50	.50	.50	.50	.50	.60	.60

No.	8	10	14	18	20	30	40	50	70	90
Height, inches	7¼	8	8½	9¾	10¼	11	12⅜	13½	14½	15⅞
Diameter, inches	5¾	6	6¾	7⅜	7¾	8⅝	9¼	10⅛	10⅞	11½
Each	2.90	3.60	4.20	5.40	6.00	8.40	11.20	14.00	19.60	25.20
Covers, each	.60	.60	.85	.85	.85	1.80	2.40	3.00	4.20	5.40

2330

2334

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2343

2350

2330. **CRUCIBLE—Alundum Melting,** highly refractory; well adapted to experimental electric furnace work. They are not suitable for use where slags are encountered, on account of their absorbent nature.

Diameter, inches	3	2¾	2⅜	1½
Height, inches	3⅝	4¾	2⅝	2
Each	2.30	2.30	1.44	.86

332. **CRUCIBLE—Melting, Opaque Fused Silica "Vitreosil,"** unaffected by sudden and extreme changes of temperature.

No.	3	6	14	16	30	60	70
Height, inches	4⅜	6⅛	7¾	8⅜	10¼	12¾	20
Diameter, inches	3¾	4½	5⅞	6¼	7¾	10⅛	12
Each	2.85	4.15	5.35	6.65	10.00	13.25	23.25

34. **CRUCIBLE—Cast Iron,** with cover.

Capacity, pints	¼	½	1	2	4	8
Each	2.25	2.60	3.00	3.40	4.50	6.75

1. **CRUCIBLE—Best American Porcelain, Coors make, WIDE form,** glazed throughout, with exception of outside bottom surface.

No.	000	00	0	1	2	3	4	5
Capacity, cc.	8	12	17	30	50	90	145	265
Diameter, top, mm.	32	37	41	46	56	67	81	96
Crucible only	.14	.18	.22	.30	.41	.52	.60	.74
Cover only	.06	.06	.08	.08	.12	.14	.18	.22
Complete	.20	.24	.30	.38	.53	.66	.78	.96

43. **CRUCIBLE**—Similar to above, but **HIGH** form.

No.	000	00	0	1	1A	2	3	4	5
Capacity, cc.	5	10	15	30	40	57	95	155	280
Diameter, top, mm.	26	30	35	41	45	52	62	72	87
Crucible only	.11	.14	.18	.29	.34	.36	.42	.54	.66
Cover only	.06	.06	.06	.08	.11	.11	.14	.14	.18
Complete	.17	.20	.24	.37	.45	.47	.56	.68	.84

2350. **CRUCIBLE—Best American Porcelain, Coors make,** cylindrical form, without cover. Diameter top 30 mm., height 32 mm., capacity 15 cc. For cut, see preceding page **0.30**

Opaque Fused Silica Ware

Coefficient of Expansion.—The coefficient of expansion of fused silica is extremely small, the exact figure being .00000054 per degree C., which is about 1/17th that of glass, in consequence of which it is possible to subject fused silica to rapid changes of temperature without danger or breakage.

Resistance to Acids.—Fused Silica is unaffected by mineral or organic acids with the exception of hydrofluoric, and **at high temperatures,** phosphoric. The action of phosphoric acid only commences at 400° C., so that for all ordinary work with this acid it can be safely used. Aqua regia or a mixture of chromic and sulfuric acids will not attack fused silica at any temperature.

Resistance to Alkalis.—Alkalis in solution are without effect upon fused silica at low temperatures, so that in many fields of research work it is to be preferred to glass apparatus. Hot solutions or fusions of the caustic alkalis attack fused silica readily.

Solubility.—Fused silica is absolutely insoluble in water, and is therefore useful in delicate chemical and physical experiments where completely insoluble vessels are essential.

Constancy of Weight.—Experiments have shown that fused silica is constant in weight, being superior to platinum in this respect. It has therefore been employed extensively in connection with determinations of atomic weights.

2354

2354. **CRUCIBLE—Opaque Fused Silica, "Vitreosil,"** glazed throughout. These crucibles, for acid and neutral fusions, are a satisfactory substitute for platinum.

No.	C00	C0	C1	C2	C3
Height, mm.	20	25	28	37	45
Diameter, mm.	38	41	47	57	68
Capacity, cc	9	12	25	35	75
Each, without cover	.85	.85	1.00	1.15	1.65
2354A. Covers only	.55	.55	.65	.85	.85

2358

2355. **CRUCIBLE—Opaque Fused Silica, American make.**

No.	C00	C0	C1	C2	C3
Height, mm.	20	25	28	37	45
Diameter, mm.	38	41	47	57	68
Capacity, cc.	9	12	25	35	75
Each	.70	.70	.90	1.05	1.45
2355A. Covers only	.60	.60	.70	.90	1.05

2358. **CRUCIBLE—Opaque Fused Silica, "Vitreosil," Platinum Shape.**

No.	C5	C6	C4
Height, mm.	35	38	50
Diameter, mm.	35	44	50
Capacity, cc.	20	30	50
Each, without cover	1.35	1.35	1.65
2358A. Covers only	.55	.55	.65

2359. **CRUCIBLE—Opaque Fused Silica, American Make, Platinum Shape.**

No.	C5	C6	C4
Height, mm.	35	38	50
Diameter, mm.	35	44	50
Capacity, cc.	20	30	50
Each, without cover	1.45	1.45	1.45
2359A. Covers only	.60	.60	.70

CRUCIBLES—Silica, Transparent, See Quartz.

2362 2366 2368 2370 2377

2362. **CRUCIBLE—Alundum,** for very high temperature work; especially suitable for coal analysis, ignitions, etc. On account of their absorbent nature they are not adapted for use where slags are formed. Without cover.

Capacity, cc.	20	25	40
Diameter, mm.	38	45	48
Height, mm.	30	28	40
Each	**.40**	**.46**	**.46**

2364. **CRUCIBLE—Copper,** polished, with cover.

Capacity, cc.	50	100	250
Each	**1.00**	**1.40**	**2.65**

2366. **CRUCIBLE—Wrought Iron,** light, with cover.

Height, mm.	30	37	50	60	75
Diameter, mm.	37	54	62	80	95
Capacity, cc.	20	50	100	200	400
Each	**.26**	**.30**	**.37**	**.52**	**.66**

2368. **CRUCIBLE—Nickel,** pure wrought, with cover.

Diameter, mm.	35	40	45	50	60	80	100
Capacity, cc.	20	30	50	75	100	250	500
Each	**1.00**	**1.10**	**1.25**	**1.80**	**2.40**	**4.85**	**6.15**

2370. **CRUCIBLE—Plattner, American Porcelain,** glazed throughout; with rim, without cover.

Diameter, mm.	40	50
Height, mm.	22	30
Each	**.20**	**.25**

2372. **CRUCIBLE—Silver,** pure, with cover.

Diameter, mm.	35	40	45	50	60	70	75
Capacity, cc.	20	30	50	75	100	150	200
Approximate weight, grams	35	45	60	80	100	150	200
Each	**5.25**	**6.75**	**9.00**	**12.00**	**15.00**	**22.50**	**30.00**

2375

2374. **CRUCIBLE—Pennock & Martin** (see J. Am. Chem. S., Dec., 1903, page 1265), for the rapid and accurate determination of sulfur in coke and coal; of solid nickel 40 cc. capacity, on aluminum base, with cover **3.00**

2375. **CRUCIBLE—Kawin,** for silicon determinations in iron, 28 mm. diameter by 15 mm. high, without cover ..... **.45**

2374

CRUCIBLE — Platinum, see **Platinum Ware.**

2377. **CRUCIBLE—Rose, best American Porcelain,** unglazed, with perforated cover and tube.

Capacity, cc.	15	30	60
Complete	**1.15**	**1.26**	**1.33**

2379. **Spare tubes** ..... **.86** **.86** **.86**

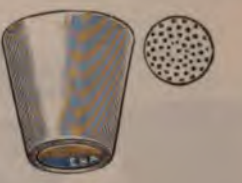
2381. **Spare covers** ..... **.07** **.08** **.11**

CRUCIBLE—Skidmore, see **Retort** No. 6000.

2382

2387

2389



2395

2392

2397

2399

2400B

2382. **CRUCIBLE—Alundum, Porous,** for filtering. No asbestos required, very rapid; will hold the finest precipitates.

Capacity, cc.	25	35
Diameter, mm.	35	40
Height, mm.	38	42
Each	**.40**	**.46**

2387. **CRUCIBLE—Gooch, best American Porcelain, Coors,** with perforated bottoms, glazed throughout, with exception of outside bottom surface; without cover.

No.	2	2a	3	4
Diameter top, mm.	27	33	35	40
Height, mm.	30	33	40	43
Capacity, cc.	10	20	25	35
Each	**.36**	**.42**	**.48**	**.54**

2389. **CRUCIBLE—Gooch, best American Porcelain, Coors,** of special shape, with large filtering surface for bitumen determinations. Diam. top, 45 mm. Diam. bottom, 35 mm. Height, 24 mm., without cover ..... **.60**

2392. **CRUCIBLE—Gooch, Solid Nickel,** with perforated bottom and extra cup, without cover, 40 mm. high, 42 mm. diameter at top, 23 mm. diameter at bottom **2.20**

2395. **CRUCIBLE—Gooch, Caldwell, best American Porcelain, Coors,** glazed inside and outside, with open flange bottom, fitted with loose perforated disc, diam. top 39 mm., height 40 mm., capacity 25 cc., with cover ..... **.74**

2395a. **CRUCIBLE** only ..... **.42**

2395b. **COVER** only ..... **.08**

2395c. **DISC** only ..... **.24**

2396. **CRUCIBLE—Gooch, Opaque Fused Silica, "Vitreosil,"** open flanged bottom for porcelain or platinum disc. Diameter at top 42 mm., at bottom 25 mm., height 42 mm., without cover or disc **1.15**

CRUCIBLE—Gooch, Platinum, see **Platinum Ware.**

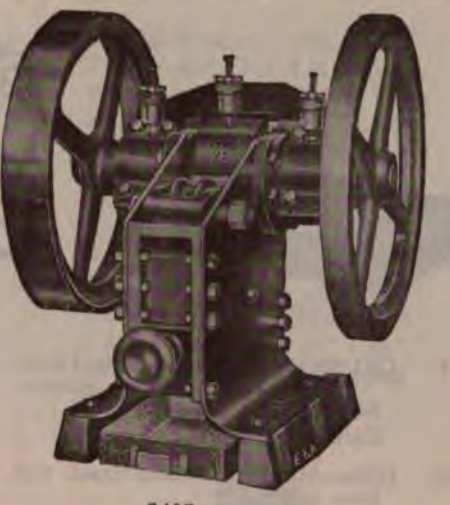
2397. **CRUCIBLE HOLDER—for Gooch Crucibles, Walter,** a combined rubber stopper and Gooch crucible holder, that will fit the neck of a filter flask up to 45 mm. outside diameter. This form is most easily removed from the flask, and is more economical than any other. The glass part is protected from breakage; with funnel..**each** **.45**
dozen **4.50**

2399. **CRUCIBLE HOLDER—Bailey,** accommodating a 25 cc. porcelain Gooch Crucible and made to fit an ordinary 2 inch glass funnel; the upper edge projects over the edge of the funnel and thus makes the seal. The lower edge of the holder rests on the side of the funnel and supports the holder when suction is on the flask; without funnel .....**each** **.30**
dozen **3.00**

2400B. **CRUCIBLE HOLDER**—for alundum Crucibles or any other filtering crucibles; especially desirable when it is necessary to submit most of the filtering surface to suction, as the ring takes up only about ⅛ of an inch on the upper rim of the crucible.

Size, No.	1	2	3
For crucibles, top diameter, mm.	27	35	40
Each	**.30**	**.35**	**.40**

2402



2405

CRUSHING, GRINDING AND PULVERIZING APPARATUS

See also **Mills**

02. **CRUSHER—Simplex, for hand power.** For crushing small samples of ore, etc. It can be quickly adjusted for coarse or fine grinding by a few turns of the two hand wheel regulating screws. The jaws are easily removable for cleaning **68.00**

Capacity, hand power, 50 lbs. per hour, to ¼ inch and smaller, opening of jaws 2 inches.

04. **Ditto—For Power.** Power required, ½ H. P.; speed 200 R. P. M.; Capacity 100 lbs.. **72.00**

04/1. **Ditto—For Power,** with T. & L. pulleys **80.00**

05. **CRUSHER—Chipmunk, type VC, No. 12, Small size, for power.** An ideal laboratory machine, with steel frame, securing strength, durability, and lightness. Readily adjusted for coarse or fine crushing by means of an adjusting screw which passes through the front spacer casting. The machine is very easily cleaned by simply lifting the stationary jaw out of its chamber, which exposes all the inner parts. The motion is both forward and downward (a rubbing motion), which impels the discharge.

When hand fed the machine will reduce rock or coal from about 2¼ down to ¼ inch and smaller at a rate of from 300 to 400 lbs. per hour, and when fed through a hopper, from 400 to 500 lbs. per hour. Opening of jaws 2¼". Power required 1 H. P., speed 400 R. P. M. **100.00**

07. **Ditto—Type VC. No. 14,** with T & L pulleys **110.00**

This is justly the most popular laboratory crusher. It is recommended for the crushing of most materials and is particularly suitable for coal.

08. **CRUSHER—Chipmunk, Type WC, No. 16, large size, for power.** This machine is the same as No. 12, but handles larger quantities of material, capacity 1000 to 1500 lbs. per hour; if fed through a hopper, 1500 to 2000 lbs. per hour. Opening of jaws 2⅜"; power required, 2 H. P.; speed 400 R. P. M. **180.00**

09. **Ditto—Type WC, No. 18,** with T & L pulleys **200.00**

2414–6

2422

2414. **CRUSHER PLATE—Chilled iron,** with rim, for quickly powdering ores; with rubber 8 x 7 inches in wooden handle.

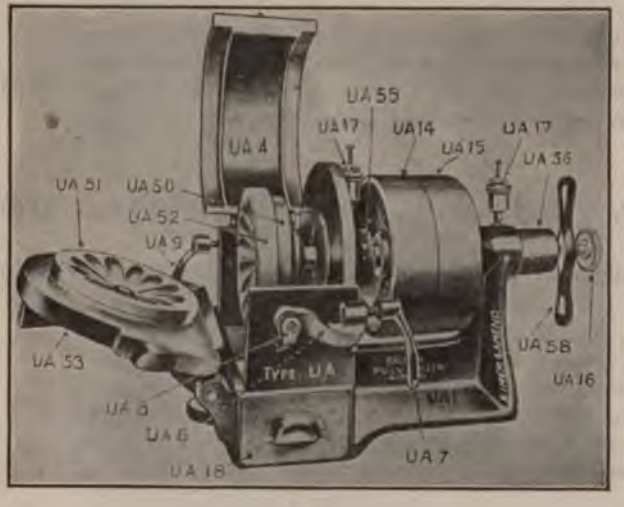
Size, inches	18 x 24	24 x 36
Each	**22.00**	**35.00**

2416. **Ditto—Hardest Chrome Steel,** with rubber 8 x 7 inches.

Size, inches	18 x 24	24 x 36
Each	**120.00**	**150.00**

2422. **CRUSHER—Taylor.** A very efficient and practical inexpensive machine. Easily adjusted for fine or coarse grinding; for hand power only **22.50**

2422A. **Extra Jaws** .....per set **4.00**



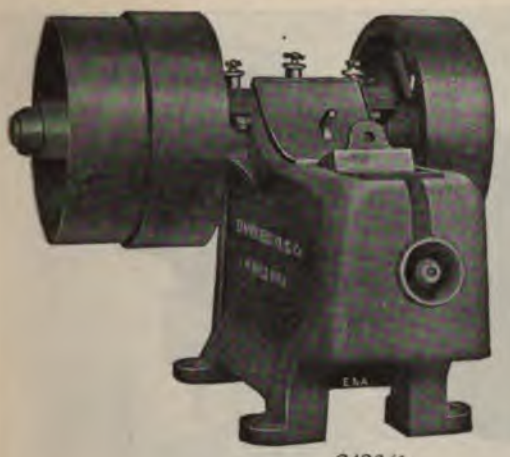
2425

2426

2425. **CRUSHER—Braun Disc Pulverizer, New Type UA, for power only.** For quickly pulverizing up to 200 mesh any material that can be reduced to pulp by the old style bucking board. The capacity depends on the fineness of the product fed into the machine; if 10 mesh, capacity is 80–90 pounds per hour 100 mesh. The machine is fed through the spout in the door, and will take ore ¼ mesh and smaller. One of the more striking features is the accessibility of all the interior parts for thorough cleaning. The new type grinding plates are made of special alloy of superior strength and toughness, assuring wearing quality and great durability. All wearable parts are renewable and easily replaced, at reasonable prices. Power required 1 H. P.; speed, 850 R. P. M.; with one set of discs **147.00**

2425A. **Extra discs** .....per set **8.75**

2426. **CRUSHER—Case improved Laboratory type, No. 1, Hand and Power.** This machine will take rock or soft substances 2½" in diameter, reducing so that same will pass through a ten mesh sieve or finer at the rate of from 50 to 150 pounds per hour... **87.50** Floor or bench space required for small size 14½" x 21". Net Weight: 140 lbs. Shipping Weight: 165 lbs.



2426/1

2426/1. **CRUSHER—Case No. 2,** for **Power** only. For 2 H. P. motor. Speed 400 R. P. M. The shaft is 1 11/16" driven by a 14" diameter pulley with 4" face. Loose pulley made slightly smaller so as to take strain off the Crusher bearing and shafting when not in use **175.00**

The crusher jaws are 10¾" x 4½" face. Jaw opening 3¼" x 4½". Floor space 27" x 28". Net weight 540 lbs. Shipping weight 660 lbs.

2427

2427/1

2427. **CRUSHER—Laboratory Sample Grinder, No. 0, Sturtevant, for Power only.** This crusher is simple and compact and is recommended for the grinding of most materials, especially coal, coke, and all kinds of dry chemicals, oilcake, etc.; can be readily cleaned without removing bolts.

The **special feature** is the arrangement whereby the circle of the grinding surfaces may be changed by **shifting** the **center of the stationary disc** or grinding plate, so it **can be moved frequently from its center,** the circle of the grinding surfaces may be changed, so that the cuts, or scores, or rings, if stated, may **grind themselves out.**

The grinder reduces ¼" and finer materials to about 100 mesh at the rate of about 100 pounds per hour, iron or steel discs being employed. Diameter of grinding plates, 6". Weight of grinder about 150 pounds net (175 lbs. gross). Power required about 2 H. P.; speed 1200 R. P. M. **100.00**

2427A. Extra set of cast steel discs .....**per set** **17.50**

2427B. Extra set of semi-steel discs .....**per set** **7.00**

2427/1. **CRUSHER—Laboratory Sample Grinder, No. 2,** larger size, **Sturtevant, for Power only.**

Same as above, but with grinding plates, 10" in diameter; reduces ¼" and finer materials to about 100 mesh, at the rate of about 100 pounds per hour. Weight of grinder about 175 pounds net (200 lbs. Gross). Power required about 3 H. P.; speed 750 R. P. M. **125.00**

2427/1A. Extra set of Manganese steel discs .....**per set** **40.00**

2427/1B. Extra set of cast iron discs .....**per set** **16.50**

2429

2429. **CRUSHER—McCool Pulverizer, Patented Model 9½–K,** especially adapted for all manner of fine grinding, either wet or dry, pulverizing either soft or hard materials to any desired mesh in one operation. The Grinding Discs are made of a composition that gives the greatest durability consistent with rapid grinding. 3 types of discs are used and provision is made for changing the stationary disc to any one of six positions.

A train of four gears is arranged to rotate the movable disc and at the same time give an eccentric motion to the shaft carrying it, thus giving the rotary disc a double rotation.

The capacity of the Pulverizer is especially large. It will reduce a one-pound sample to 100 mesh in thirty seconds. The capacity, of course, is dependent largely on the character of the material, the size and the mesh of the feed, and the desired mesh of the products. The gears run noiselessly in oil and a sight gauge indicates amount of oil required at all times.

The apparatus complete with one set of grinding discs **220.00**

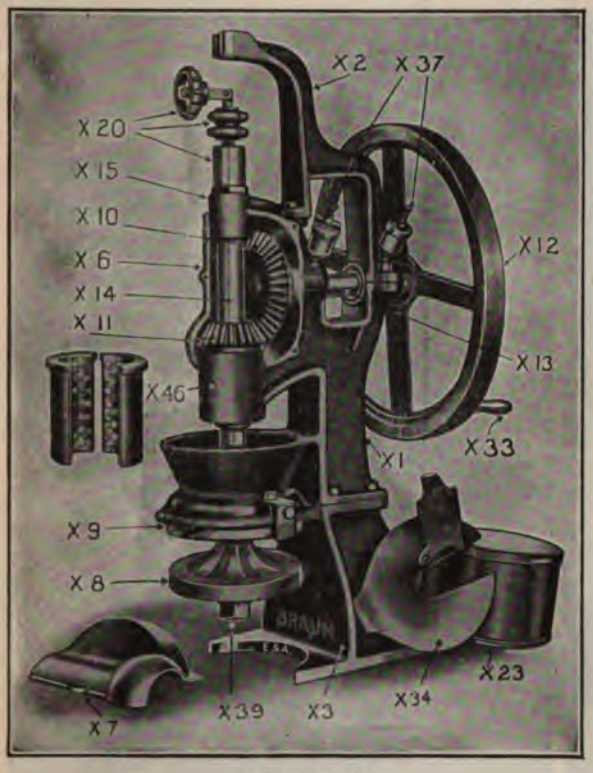
2429A. Extra discs .....per set **11.75**

A Few Salient Features

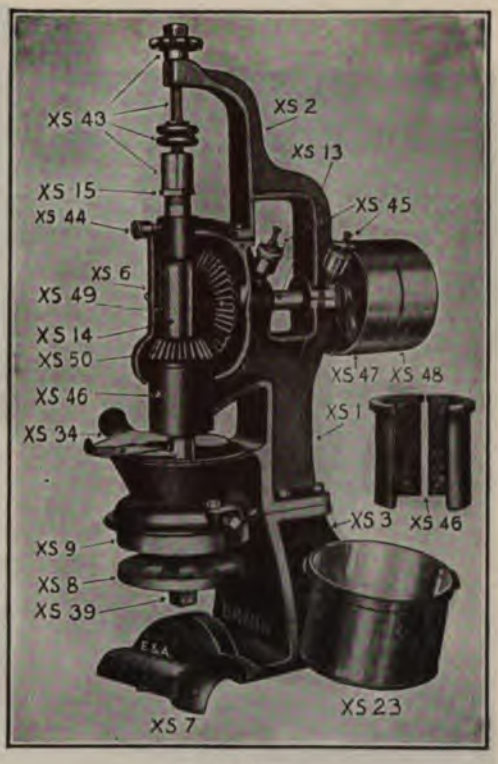
1. Dust proof.
2. No danger of salting.
3. Automatic facing and adjustment of the grinding discs.
4. Instantaneous adjustment of fineness of grinding.
5. Stationary discs may be turned to any of six positions.
6. Only one oil gauge to watch; this governs the entire oiling system.
7. Replacement of grinding discs may be made in less than two minutes.
8. Combined crushing and fine grinding movement, due to the eccentric mounting and double rotation.
9. There are no screws that a careless operator might tighten and that would bind the bearings and thus affect its operation.
10. It is automatically oiled with the single exception of the hopper hinge pin, which occasionally requires only a few drops of oil.
11. In proportion to the amount of work done, the machine is light of weight, and being compact, it requires but little floor space.

Specifications

Diameter of discs 9½ inches.
Diameter of pulleys 12x4 inches.
Speed recommended 275 r. p. m.
Horsepower 2.
Shipping Weight 570 lbs.
Length Overall 40 inches.
Height Overall 17 inches.
Width Overall 18 inches.



2432 and 2438



2437

GRINDING PLATES For Iron Ore or Cement

GRINDING PLATES For Coal

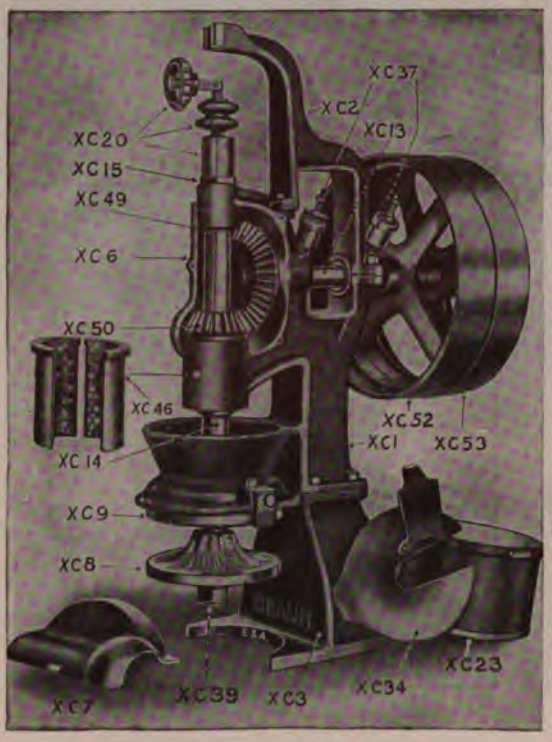
2432. **CRUSHER—Braun Sample Grinder No. 6R. A Hand Power** pulverizer especially designed for laboratory purposes; will pulverize to any degree of fineness up to 200 mesh. The adjustment may be altered instantly. By lowering the revolving disc all portions are readily accessible for thorough cleaning. Capacity, using hard rock, 4 oz. to 100 mesh in 3 minutes; complete with one set of discs 6″ diameter **87.50**

2434. **Ditto—For Power,** with T. & L. Pulleys, power required, ½ H. P.; speed, 200 R. P. M. For cut see next page **97.50**

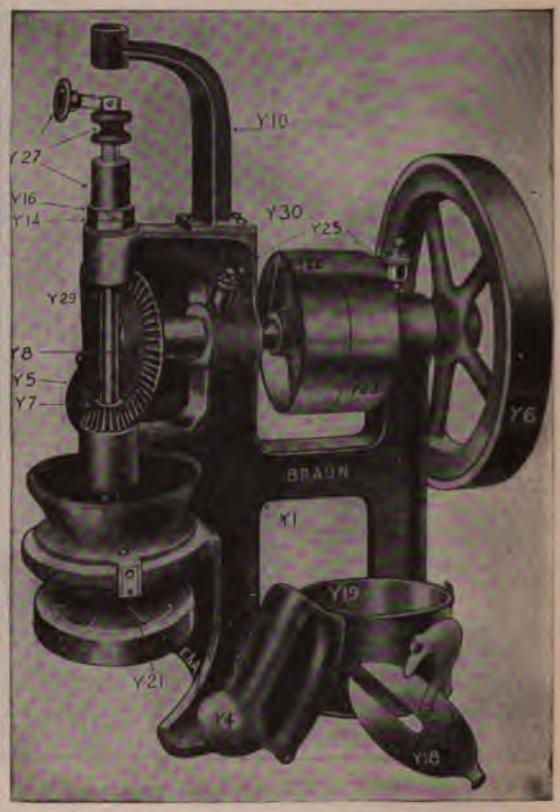
2434A. Extra discs for above .....**per set** **8.50**

2437. **CRUSHER—Braun Iron Ore Grinder No. 6S.** This machine is similar to No. 2432, and is fitted with plates 6 inches in diameter, made of special carbon steel with low phosphorus content, especially for grinding iron ore samples. It is designed for intermittent use in laboratories where continued operation is not required. **For Power,** with T. & L. pulleys, speed recommended 500 R. P. M., power required 1 H. P. Capacity 1 lb. to 100 mesh in 2 minutes **133.00**

2437A. Extra discs for above .....**per set** **20.50**



2434 and 2440



2437/1, 2441, 2441/1

2437/1. **CRUSHER—Braun Iron Ore Grinder No. 7.** Similar to No. 2437, but of more substantial construction for continuous operation, capacity 1 pound to 100 mesh in 90 seconds. The construction permits of grinding very hard material with a minimum of friction on the grinding surfaces. Fitted with carbon steel grinding plates, having low phosphorus content, 7 inches in diameter. **For Power,** with T. & L. pulleys, speed recommended 600 R. P. M. **187.00**

2437/1A. Extra discs for above .....per set **26.00**

2438. **CRUSHER—Braun Coal Grinder No. 6C.** This is the same machine as No. 2432, but fitted with special discs for quickly reducing coal and coke samples to the fine mesh required for coal analysis and calorimetric determinations, for which purpose hundreds of these machines are giving entire satisfaction. **For Hand Power,** complete with one set of discs. For cut see preceding page **117.00**

2440. **Ditto—For Power,** with T. & L. pulleys, power required ½ H. P., speed, 200 R. P. M. **122.00**

2440A. Extra discs for above .....per set **8.50**

2441. **CRUSHER—Braun Cement Grinder No. 7a.** Built especially for grinding cement laboratory samples, including cement rock, clincker, and lime rock. Used also in metallurgical and general industrial laboratories. The Grinding Plates, 7″ diameter, are made of a special alloy combining strength and toughness. Capacity 1 lb. to 100 mesh in 1½ minutes. **Power** required, 1 H. P.; speed, 600 R. P. M. **177.00**

2441A. Extra discs for above .....per set **8.75**

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2441/1. **CRUSHER—Braun Coal Grinder No. 7c.** A large grinder for coal and coke samples for continuous operation. Grinding Plates are 7″ in diameter, and are made according to special design, so as not to stick and clog. **Power** required 1 H. P.; Speed 320 R. P. M. Will reduce samples ¼″ and smaller to any degree of fineness in one operation. For cut see preceding page **177.00**

2441/1A. Extra discs for above .....per set **8.75**

2442. **CRUSHER—Clarkson Crusher and Pulverizer Combined.** Does the work of a rock breaker and mortar, crushes and pulverizes very rapidly almost any material from clay to cast iron **40.00**

2444. **CRUSHER—Mortar Grinder.** Complete with **agate** mortar and pestle 4¼ inches diameter **115.00**

With this machine grinding is accomplished by revolving the mortar, while the pestle is revolving still more rapidly and given a motion of translation across the face of the mortar. The mortar is readily removed by loosening a set screw and dropping one of the four posts holding the mortar in place. A scraper keeps the ore in the centre of the mortar, while the combined rolling and sliding motion of the pestle reduces very rapidly to fine mesh the hardest of ores. **Power** required, ¼ H. P.

2441/1. **CRUSHER—Mortar Grinder.** Same as above with **tool steel** mortar and pestle 4½″ diameter **80.00**

2445. **CRUSHER—Hand Power Laboratory Mill,** very serviceable, will grind a great variety of substances. Capacity 1 to 10 lbs. per hour; speed 30 to 50 R. P. M..... **6.60**

2445/1. **CRUSHER—Quaker City Grinding Mill,** grinds all kinds of drugs and chemicals, recognized as standard, capacity 30 to 50 lbs. per hour, speed 30 to 60 R. P. M., **with handwheel** 34″ in diameter, for bolting to table or counter. Cut similar to 2445/2 ..... **44.00**

2445/2. **CRUSHER—Quaker City Grinding Mill, for power,** capacity 50 to 100 lbs. per hour with T. & L. pulleys, 12x3″ in diameter, power required 1 to 1½ H. P., speed 175 to 250 R. P. M. For cut see next page **55.00**

2445/2

2451

2446. **CRUSHER—Hance Laboratory Grinder, size No. 1, operated by hand** for powdering, granulating, mixing and grinding dry samples, drugs, and soft substances, such as coal, etc., up to about 60 mesh; does not clog. With 22 inch wheel, for bolting to table or counter. Cut similar to 2451 ..... **84.00**

2447. **CRUSHER**—Same as above, on cast iron column or pedestal **102.00**

2448. **CRUSHER**—Same as above, on dust-tight boxstand **102.00**

2449. **CRUSHER**—Same as No. 2446, **for power.** The machine is equipped with 10 x 3" T. & L. pulley and has a speed from 150 to 200 R. P. M., for bolting to table or counter **84.00**

2449/1. **CRUSHER**—Same as No. 2449, on dust-tight boxstand **102.00**

2451. **CRUSHER—Hance Laboratory Grinder, Size No. 2, for power only,** of greater strength and capacity, yet embracing the simplicity, style and characteristics of the No. 1 size; equipped with 14 in. grinding plates; mounted on heavy boxstand; diameter of pulleys 12 x 4 inches; power required 5 H. P., speed 200 R. P. M. **228.00**

2451/1

2451a. Extra grinding plates for No. 1 .....**per set** **30.00**

2451b. Extra grinding plates for No. 2 .....**per set** **72.00**

2451/1. **CRUSHER—Ball Mill Laboratory Pulverizer.** An iron ball mill of laboratory size for grinding wet or dry material, especially recommended for use in experimental flotation work, where the oil or reagent is mixed with the sample. The maximum capacity is 25 lbs. of ore. An assortment of iron balls ¾", 1" and 1¼" sizes are included. The sample should be around 20 mesh or finer before being placed in the ball mill. With tight and loose pulleys **102.00**

2452

2453

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2457

2452. **CRUSHER—Ball Mill Pulverizer Jars.** For grinding in a wet or dry state, c. p. chemicals, glazes and substances which must not come in contact with metal. Balls of flint are used in the porcelain drum, which is tightly closed by a clamped lid.

Capacity	1 quart	1 gallon	4 gallons
Each	8.87	19.55	45.10

Separate Parts

a.	Jar only	7.00	13.50	34.00
b.	Cover	1.00	3.00	6.00
c.	Gasket	.09	.25	.60
d.	Neckband	....	1.80	2.00
e.	Cross Bar	.65	.60	1.25
f.	Flint Pebbles	.13	.40	1.25

2453. **CRUSHER—Ball Mill Pulverizer,** single specimen mill with 1 quart jar, mounted complete as illustrated, **for power** **23.50**

2454. **CRUSHER—Ball Mill Pulverizer, Assay Mill, Type A,** with 1 gallon size Jar, mounted, complete as illustrated. Single Jar—for hand or power (The Little Trojan) **55.00**

2454/1. **Ditto**—for power with T. & L. pulley **57.50**

2454/2. **CRUSHER**—Same as 2454, but **Double Jar**—for power. **85.00**

2454/3. **Ditto**—with T. & L. pulley **87.50**

2454/4. **CRUSHER**—Same as 2454, but **Triple Jar**—for power with T. & L. pulley **117.00**

2454/5. **CRUSHER**—Same as 2454, but **Quadruple Jar**—for power with T. & L. pulley **150.00**

2454/6. **CRUSHER**—Same as 2454, but **Sextuple Jar**—for power with T. & L. pulley **235.00**

2455. **CRUSHER—Jar Mills,** complete with 4 gal. size jars, mounted as illustrated, similar to 2454, but larger.

Size	Single No. 1 with T. & L. pulley for power	Double No. 2 with T. & L. pulley for power
Each	101.50	150.00

2457. **CRUSHER—Ball Mill Combination Pulverizer,** arranged for direct motor drive, if desired. For Jars of 1½, 5, 15, or 25 lbs. capacity. State size and number of jars desired. If with direct connected motor, give details of your current ..... **price on application**

2461

2470

2473

2458. **CRUSHER—Balls,** of porcelain.

Size, inches	½	¾	1	1½	2
Per lb.	.75	.70	.60	.30	.20

2459. **CRUSHER—Balls,** of flint ..... per lb. .10

CRUSHER—Bacteria grinders, see Bacteriological Catalog, Section II.

CRUSHER—Grinding Mills, see Mills.

CRYOSCOPE—see Milk Testing Apparatus, also Bacteriological Catalog.

CULTURE—Dishes, Flasks, etc., see Dishes, &c., and Bacteriological Catalog, Section II.

2460. **CUPELS—Torrey & Eaton,** of best washed bone ash. These cupels are of unequalled excellence.

Diameter, inches	1	1⅛	1¼	1⅜	1½	1⅝	1¾	1⅞	2
Absorbing, grams	10	15	20	25	30	40	50	60	75
Per 100	**2.20**	**2.75**	**3.30**	**3.85**	**4.40**	**5.00**	**5.50**	**6.00**	**6.60**

2461. **CUPELS—Composite.** These Cupels are made from the best bone ash and have all the proper qualities.

Diameter on top, inches	1	1⅛	1¼	1½	1¾	2
Absorbing, grams	10	15	20	30	50	75
Per 100	**3.50**	**4.00**	**4.40**	**4.80**	**5.25**	**6.10**
Per 1000	**31.50**	**36.00**	**39.60**	**43.20**	**47.25**	**54.90**

2464. **CUPELS—Pure Bone Ash.**

Diameter on top, inches	1	1⅛	1¼	1½	1¾	2	2½
Absorbing, grams	10	15	20	30	50	75	150
Price per 100	**4.00**	**4.40**	**4.80**	**5.25**	**6.10**	**7.90**	**12.25**
Price per 1000	**36.00**	**39.60**	**43.20**	**47.25**	**54.90**	**71.10**	**110.25**

CUPEL—Moulds, see Moulds.

CUPEL—Tongs, see Tongs.

2465. **CUPEL—Bone Ash** ..... per lb. .25

2470. **CUPEL MACHINE—Table form,** for hand feed; with either 1¼, 1½ or 1¾ inch mould and disc which are interchangeable 43.00

2472. **Ditto**—All three sizes 64.00

2473. **CUPEL MACHINE**—Capacity 500 cupels per hour, to be operated by foot power. The changing of the dies to make any of the sizes below is simple and takes less than a minute; all dies are of brass.

Price of machine, **without table,** to make 1¼ and 1½" cupels 37.50

2473/1. **Ditto**—to make 1¼, 1½, 1¾ and 2" cupels 42.50

2476 2481 2482 2484 2490

2476. **CUPEL—Tray,** of iron, accommodating 16 cupels; with detachable handle ..... **.80**

2481. **CUP—Annealing.**

No.	A	B	C	D
Diameter at top, inches	1⅛	1¼	1½	1¾
Dozen	**2.50**	**2.50**	**2.50**	**2.50**

2482. **CUP—Miner,** agateware, with handle.

Diameter, inches	5	6
Each	**.65**	**.80**

2484. **CUP—Porous,** for batteries.

Diameter, inches	1½	2	2	2⅛	2¼	3⅛	3⅛	4
Height, inches	3	3	4¼	4¾	6	7¼	8	11
Each	**.18**	**.22**	**.26**	**.30**	**.35**	**.60**	**.65**	**1.25**

2490. **CUP—So-called "Swimming Cup,"** for washing specimens. Made of porcelain, with perforations. The cork stopper floats the cup in the washing fluid; diameter 27 mm. **.60**

2492. **Ditto**—Diameter 35 mm. ..... **.78**

Cylinders

2494. **CYLINDER—Hydrometer Jar,** with lip, heavy glass; on foot. For cut, see next page.

Height, inches	5	5	6	6	6	6
Diameter, inches	1¼	1½	2	1	1½	2
Each	**.50**	**.54**	**.58**	**.47**	**.55**	**.60**
Height, inches	8	8	10	10	12	12
Diameter, inches	1½	2	1½	2	1½	2
Each	**.60**	**.65**	**.70**	**.72**	**.72**	**.75**
Height, inches	12	15	15	18	20	20
Diameter, inches	3	1½	2	2	2	2½
Each	**1.00**	**.72**	**.80**	**1.00**	**1.30**	**1.75**

2496. **CYLINDER—Ring neck,** heavy glass; on foot. For cut, see next page.

Height, inches	4	5	6	6	6	8	8	8	10
Diameter, inches	1	2	1	1½	2	1½	2	3	1½
Each	**.50**	**.60**	**.55**	**.65**	**.70**	**.70**	**.75**	**1.00**	**.75**
Height, inches		10	10	12	12	12	12	15	15
Diameter, inches		2	4	1½	2	3	4	1½	2
Each		**.80**	**1.75**	**.80**	**.85**	**1.10**	**1.80**	**.82**	**.90**
Height, inches		15	18	20	20	25	25	30	30
Diameter, inches		3	2	3	4	3	4	3	4
Each		**1.35**	**1.20**	**3.00.**	**4.25**	**4.00**	**6.60**	**6.00**	**7.50**

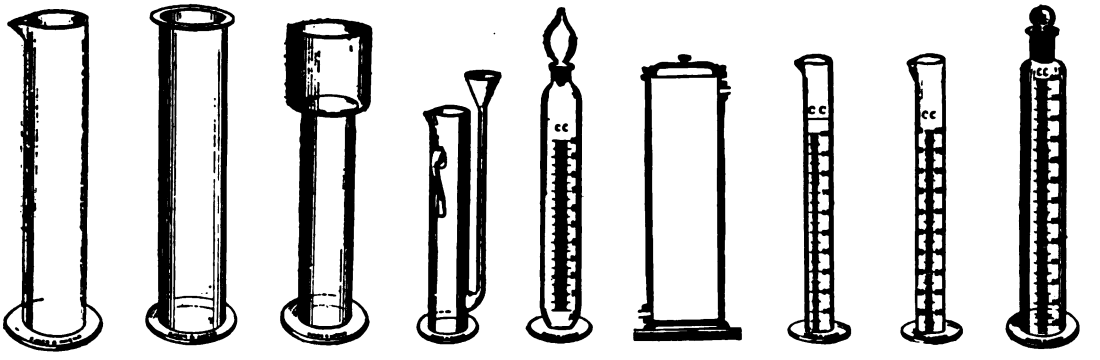
2498. **CYLINDER—Enlarged top,** for use with hydrometers, to guard against overflow. For cut, see next page.

Height, inches	14	12	16
Diameter of body, inches	1½	2	2½
Each	**.70**	**.95**	**1.20**

2500. **CYLINDER—Drip Cup,** for acid chamber; with side funnel tube and handle. For cut, see next page.

Height of cylinder, inches	5	6	7	10
Each	**.85**	**1.00**	**1.15**	**1.30**

CYLINDER—Urinometer and sediment glass combined. See No. 6720.



2494 2496 2498 2500 2506 2508 2512 2514 2522

2504. **CYLINDER—Oil Sample,** flat parallel sides, for oil samples; glass stoppered **2.00**

2506. Ditto—graduated, 100 cc. **3.00**

2508. **CYLINDER—Filtering, Stoneware,** acid proof.

Height, inches	34	37
Diameter, inches	8½	10¼
Capacity, gallons	7½	12
Each	**25.00**	**33.00**

2512. **CYLINDER—Graduated,** accurate with **Single** graduations, lipped.

Capacity, cc.	5	10	15	25	50	100
Each	**.40**	**.48**	**.50**	**.65**	**.68**	**.70**
Capacity, cc.	200	250	300	500	1000	2000
Each	**.85**	**.90**	**1.00**	**1.20**	**1.80**	**4.20**

2514. **CYLINDER—**similar to above with **Double** graduations, to read up and down, lipped.

Capacity, cc.	5	10	25	50	100	200
Each	**.45**	**.50**	**.60**	**.70**	**.75**	**1.05**
Capacity, cc.	250	300	500	1000	2000	4000
Each	**1.15**	**1.30**	**1.60**	**2.20**	**6.30**	**9.50**

2516. **CYLINDER—Graduated, Standard,** lipped, see next page.

2519. **CYLINDER—Graduated, Standard,** lipped, see next page.

2519/1. **CYLINDER—Graduated, Standard,** lipped, see next page.

2520. **CYLINDER—Graduated** in ounces and fractions, single graduations, lipped.

Capacity, ounces	1	2	4	8	16	32
Each	**.60**	**.70**	**.80**	**1.20**	**1.50**	**2.25**

2522. **CYLINDER—Graduated** and **Stoppered, Single** graduations.

Capacity, cc.	5	10	25	50	100	200
Each	**.80**	**.90**	**1.15**	**1.30**	**1.35**	**1.65**
Capacity, cc.	250	300	500	1000	2000	4000
Each	**1.75**	**1.95**	**2.70**	**3.80**	**6.30**	**9.50**

2524. **CYLINDER—Graduated** and **Stoppered, Double** graduations, to read up and down.

Capacity, cc.	5	10	25	50	100	200
Each	**.85**	**1.00**	**1.20**	**1.45**	**1.50**	**1.90**
Capacity, cc.	250	300	500	1000	2000	4000
Each	**2.10**	**2.40**	**3.15**	**4.20**	**8.40**	**11.55**

2525. **CYLINDER—Graduated, Standard,** stoppered, see next page.

2525/1. **CYLINDER—Graduated, Standard,** stoppered, see next page.

2527. **CYLINDER—Graduated, Standard,** stoppered, see next page.

CYLINDER—Imhoff, for **Sewage Testing,** see No. 7333.

2516

2525

Cylinders, Standard, Precision

2516. **CYLINDER—S. S., Standard,** lipped.

In the manufacture of S. S. standard cylinders our factory follows the instructions and specifications as laid down by the Bureau of Standards as closely and painstakingly as possible. The most modern appliances, machines, and methods of calibrating, approved by the Bureau of Standards, are used. We cannot, however, guarantee that every piece will receive a Bureau of Standards' certificate, since the requirements of certification are so exceptionally stringent.

Capacity, ml.	5	10	25	50	100	250	500	1000
Subdivisions, ml.	1/20	1/10	1/5	1/5	1/1	5/1	5/1	10/1
Each	**1.80**	**2.00**	**2.75**	**3.25**	**3.50**	**4.25**	**5.75**	**6.75**

2519. **CYLINDER—S. R., Standard,** lipped.

These cylinders are drawn from our stock of S. S. standard cylinders. They have been sent to the Bureau of Standards and have received a **report.**

Capacity, ml.	5	10	25	50	100	250	500	1000
Subdivisions, ml.	1/20	1/10	1/5	1/5	1/1	5/1	5/1	10/1
Each	**3.60**	**3.80**	**4.50**	**5.00**	**5.25**	**6.00**	**7.20**	**8.00**

2519/1. **CYLINDER—S. C., Standard,** lipped.

These cylinders are drawn from our stock of S. S. standard cylinders. They have been sent to the Bureau of Standards and have received a **Certificate.**

Capacity, ml.	5	10	25	50	100	250	500	1000
Subdivisions, ml.	1/20	1/10	1/5	1/5	1/1	5/1	5/1	10/1
Each	**4.00**	**4.25**	**5.00**	**5.50**	**5.75**	**6.50**	**8.00**	**9.00**

2525. **CYLINDER—S. S., Standard,** stoppered.

See description under No. 2516.

Capacity, ml.	5	10	25	50	100	250	500	1000
Subdivisions, ml.	1/20	1/10	1/5	1/5	1/1	5/1	5/1	10/1
Each	**2.50**	**2.75**	**3.50**	**4.00**	**4.50**	**5.25**	**6.75**	**7.75**

2525/1. **CYLINDER—S. R., Standard,** stoppered.

See description under No. 2519.

Capacity, ml.	5	10	25	50	100	250	500	1000
Subdivisions, ml.	1/20	1/10	1/5	1/5	1/1	5/1	5/1	10/1
Each	**4.25**	**4.50**	**5.25**	**5.50**	**6.00**	**6.75**	**8.00**	**9.00**

2527. **CYLINDER—S. C., Standard,** stoppered.

See description under No. 2519/1.

Capacity, ml.	5	10	25	50	100	250	500	1000
Subdivisions, ml.	1/20	1/10	1/5	1/5	1/1	5/1	5/1	10/1
Each	**4.75**	**5.00**	**5.75**	**6.25**	**6.75**	**7.50**	**9.00**	**10.00**

2528

2532

2536

2548

2528. **DESICCATOR—Scheibler,** superior make with broad rim and well-fitting ground cover.

Diameter inside, inches	4	5	6	8	10
Each	**1.10**	**1.50**	**1.90**	**8.00**	**13.25**

2530. **Ditto**—With Porcelain plate, each **1.85** **2.35** **2.90** **9.80** **15.75**

2532. **DESICCATOR—Scheibler,** with stopcock and hook ground in tubulature of cover. Not guaranteed for high vacuum.

Diameter inside, inches	4	6	8	10
Each	**5.75**	**6.50**	**12.75**	**18.00**

2534. **Ditto**—With Porcelain plate, each **6.75** **7.50** **14.50** **20.50**

2536. **DESICCATOR—Scheibler,** with tubulature on side. Not guaranteed for high vacuum.

Diameter inside, inches	6	8	10
Each	**5.00**	**7.50**	**11.00**

2538. **Ditto**—With Porcelain plate, each **6.00** **9.30** **13.50**

2540. **DESICCATOR—Scheibler,** tubulature on side, with glass stopcock ground in.

Diameter inside, inches	6	8	10
Each	**8.25**	**11.00**	**15.00**

2542. **Ditto**—With Porcelain plate, each **7.25** **12.80** **17.50**

2548. **DESICCATOR—Atwater;** inside dimensions 4¼ inches **4.20**

2550

2552

2554

2556

2558

2550. **DESICCATOR—Frühling & Schultz,** with porcelain plate.

Diameter inside, inches	8	10
Each	**9.25**	**15.00**

2552. **Ditto**—With glass stopcock, and hook ground in. Not guaranteed for high vacuum **13.35** **19.20**

2554. **DESICCATOR—Hempel Improved,** with stoppered tubulature. The absorbent is placed in the upper part where the aqueous vapors accumulate, ensuring rapid drying.

Diameter inside, inches	4	5	6
Each	**3.50**	**4.00**	**4.75**

2556. **Ditto**—With glass stopcock ground in.

Diameter inside, inches	4	5	6
Each	**6.50**	**7.25**	**8.00**

2558. **DESICCATOR—Mitscherlich,** cylindrical, 6 inches deep, 4 inches diameter; with tubulature on side and ground in glass stopcock, and glass tripod .....

DESICCATOR—Triangular, 87x50 mm. high; suitable for placing in the corner of a balance case. See No. 438.

2568

2570

2572

2574

2578

2580

2577

2568. **DESICCATOR—Vacuum,** of heavy glass, with ground in manometer and glass stopcock; jar 8 inches high, 6 inches diameter; with ground glass plate **15.00**

2570. **DESICCATOR—Stelling,** with glass rack for supporting dishes, etc.; and ground glass plate. Jar, 12 inches high, 6 inches diameter **18.00**

2572. **DESICCATOR**—Consisting of porcelain acid dish No. 2600, bell jar and ground glass plate.

Diameter of acid dish, inches	4	4	5½	6
Diameter of bell jar, inches	7	8½	9	10
Glass Plate, inches square	8	9	10	12
Each	**4.60**	**5.75**	**6.75**	**8.60**

2574. **DESICCATOR—Glass Triangles,** on feet, to stand inside desiccators.

For desiccator; diameter, inches	4	5	6
Each	**.45**	**.50**	**.60**

2577. **DESICCATOR—Closet (Cabinet Sterilizer),** of plate glass, mounted in wooden frame, perfectly air-tight, hand made, white enameled finish, used extensively by Surgeons, Dentists, Doctors, etc., for sterilizing their tools. Outside measurements 14½″ long x 12¼″ x 9½″ deep **15.00**

DESICCATOR PLATES—See Plates.

DESICCATOR SUPPORT, for crucibles—See Supports.

2578. **DIALYZER—Graham,** consisting of a heavy glass dish, with inner vessel fitted with parchment paper.

Capacity of dish, gallons	½	1	2	3
Each	**5.50**	**7.50**	**11.00**	**14.00**

2580. **DIALYZER—Graham,** bell shaped, with cylindrical heavy glass jar.

Capacity of jar, gallons	½	1	2	3
Each	**4.00**	**5.50**	**7.50**	**10.00**

2583. **DIAMOND**—For writing on glass, mounted in rosewood handle **2.50**

2586. **DIAMOND**—For cutting glass, mounted in ebony handle **4.00**

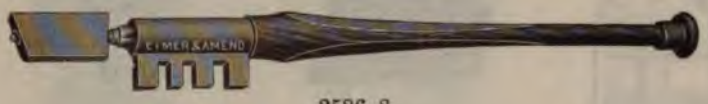
2588. **DIAMOND**—For cutting glass, glazier's, mounted in wooden handle, superior for all kinds of glass **9.00**

2589. **DIAMOND—Universal Diamond Glass Cutter** mounted in wooden handle, suitable for inexperienced users **4.00**

2590. **DIAMOND**—Ink, for writing on glass; 1 oz. bottle ..... **.50**

For cuts Nos. 2583–2589, see next page.

2583



2586–8

2589

For description, see preceding page

2594

2596

2598

2594. **DIE—Figures,** steel, for marking bullion, etc. Set of nine.

Size, inch	⅛	3/16	¼	⅜	½
Per set	**1.25**	**1.50**	**2.00**	**3.00**	**4.50**

2596. **Ditto—Letters,** steel, for marking bullion, etc. Full alphabet.

Size, inch	⅛	3/16	¼	⅜	½
Per set	**3.75**	**4.50**	**6.00**	**9.00**	**13.50**

DIFFUSION SHELLS—See Paper.

DIGESTERS—See Autoclaves.

2598. **DIPPER—Agate Ware,** with wooden handle.

Diameter, inches	4¼	5¼	6
Each	**.80**	**.90**	**.95**

2600

2602

2604

2605

2600. **DISH—Acid,** of porcelain.

Diameter, cm.	10	12	14.5	16.5
Partitions	3	3	6	6
Each	**1.80**	**2.00**	**2.50**	**3.00**

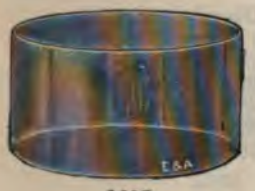
2602. **DISH—Aluminum,** flat bottom, straight sides, as used in milk analysis, etc.

Diameter, mm.	65	70	90
Depth, mm	15	20	38
Each	**.25**	**.35**	**.60**

2604. **DISH—Aluminum,** flat bottom, with fit over lid; for moisture determinations, etc.

Diameter, mm.	70	90
Depth, mm.	30	15
Each	**.50**	**.60**

2605. **DISH—Aluminum, Flat Bottom with Slip-in Lid.** This form of lid facilitates removal when hot; also is convenient for handling by tongs. Size, diameter 58 mm., height 17 mm. ..... **.45**


2607

2608

2611

2615

2607. **DISH—Crystallizing,** flat bottom, straight sides. **Resistance glass.**

Size, mm.		50x35	60x35	70x45	80x40	90x50	100x50
Each		**.12**	**.13**	**.14**	**.15**	**.16**	**.20**
Size, mm.	115x60	125x65	150x75	170x85	190x95	215x110	250x125
Each	**.28**	**.36**	**.48**	**.64**	**.80**	**.90**	**1.84**

2608. **DISH—Crystallizing, Porcelain,** glazed inside, with lip; flat bottom, straight sides.

Diameter, cm.	16	21.5	25	30	35	40
Each	**1.20**	**1.50**	**2.25**	**4.50**	**5.40**	**10.00**

2611. **DISH—Evaporating,** with lip, **Porcelain, Coors;** sizes up to 5 are glazed inside and outside with exception of rim, larger sizes are partly glazed outside.

Size number	000	00	0	1	2	3	4	5	6
Diameter, mm.	60	70	80	85	90	100	110	120	145
Height, mm.	24	27	30	33	37	42	43	50	48
Capacity, cc.	35	60	80	100	140	175	210	300	385
Each	**.14**	**.22**	**.24**	**.36**	**.42**	**.48**	**.54**	**.66**	**.84**
Size number	6a	7	8	8a	9	10	11	12	13
Diameter, mm.	162	185	215	230	265	305	360	400	460
Height, mm.	51	54	63	70	80	95	116	140	175
Capacity, cc.	535	765	1285	1430	2200	3250	5700	10000	16500
Each	**.96**	**1.08**	**1.44**	**1.80**	**2.16**	**3.60**	**4.80**	**10.80**	**21.60**

2614. **DISH—Evaporating, Porcelain, deep form,** glazed inside, with lip; large sizes. Cut similar to 2615.

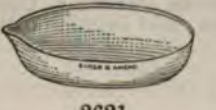
No.	0	00	000
Diameter, cm.	36	44	63
Capacity	6L	10L	30L
Each	**8.00**	**12.00**	**30.00**

2615. **DISH—Evaporating, Porcelain, Coors,** with heavy welter rim. Glazed inside, but only partly outside.

Size number	12	13
Diameter, mm.	400	460
Height, mm.	140	175
Capacity, cc.	10000	16500
Each	**14.40**	**24.00**

2617

2619


2621

2625

2617. **DISH—Evaporating, American Porcelain,** shallow form, with lip, entirely glazed.

Size number	0	1	2	3	4	5	6	7
Capacity, cc.	20	45	60	95	160	200	350	550
Height, mm.	12	15	20	23	30	34	40	48
Diameter, mm.	60	70	80	95	105	130	140	160
Each	**.15**	**.20**	**.25**	**.40**	**.50**	**.60**	**.75**	**.90**

2619. **DISH—Evaporating, Porcelain, Coors,** shallow form, with lip. Glazed inside but only partly outside.

Size number	1	2	3	4	5	6	7
Diameter, mm.	70	80	95	105	120	140	160
Height, mm.	15	20	23	30	34	40	48
Capacity, cc.	45	60	95	160	200	350	550
Each	**.24**	**.30**	**.48**	**.60**	**.72**	**.90**	**1.08**

2621. DISH—Evaporating, American Porcelain, with lip and flat bottom. Glazed inside and a short distance below the rim on outside. For cut, see preceding page.

Size No.	1	2	3	4	5	6	7
Capacity, cc.	45	60	95	160	200	350	550
Height, mm.	15	16	22	25	28	35	40
Diameter, mm.	70	80	95	105	120	140	160
Each	.20	.25	.40	.50	.60	.90	1.20

2622. DISH—Evaporating, Porcelain, with wooden handle.

Diameter, cm.	12	15.5	21.5
Capacity, cc.	225	500	850
Each	1.20	1.70	3.00

2625. DISH—Evaporating, round bottom, with lip. **Resistance Glass.** For cut, see preceding page.

Size, mm.	50	60	70	80	90
Each	.16	.18	.20	.26	.33
Size, mm.		105	125	150	200
Each		.40	.60	.70	1.00

2627. DISH—Evaporating, flat bottom, with lip. **Resistance Glass.** Same prices as No. 2625.

2628

2630

2639

2646

2628. DISH—Shallow, porcelain lined, **Agate,** steel enamelled.

Diameter, inches	8	10	12	16	18	20	24	28
Capacity, gallons	⅜	⅝	1¼	3	4½	6	11	16
Each	1.30	1.85	2.35	3.10	3.90	4.75	11.65	12.25

2630. DISH—Cast iron, deep, heavy white enamelled inside, with detachable handles.

Diameter, inches	7	8	10
Capacity, pints	1½	2	4
Each	1.00	1.25	1.60

Diameter, inches	13	16	18	22
Capacity, gals.	1	2	3	4
Each	2.00	4.40	6.00	12.00

2632. DISH—Lead, round, shallow, for holding hydrofluoric acid.

Diameter, cm.	5	6.5	7.5	10	15
Each	.11	.16	.19	.30	.62

2639. DISH—Milk, American Porcelain, Coors, without lip, glazed throughout, straight sides and flat bottom, used in milk analysis, etc.

Size number	1	3	4
Diameter, mm.	42	69	72
Height, mm.	12	13	16
Capacity, cc.	13	25	45
Each	.30	.42	.48

2640. DISH—Milk, of tin foil, in shape of bottle caps; used considerably for milk analysis.

Size	2¾x¾	2½x1 1/16	3½x½
Per 100	3.00	3.30	3.30

2642. DISH—Solid wrought nickel, round bottom, with lip.

Diameter, cm.	4	5	6	7	8	9	10	12	15
Each	.80	1.00	1.20	1.60	2.20	2.65	3.25	4.00	5.60

2644. DISH—Solid wrought nickel, for sugar analysis. Set of 3, diam. 5 cm., without lip; with tare weight 5-0

2646. DISH—Nickel, deep form for sugar analysis, diam. 7.5 cm., with large lip and tare weight 4-2

DISH—Platinum, see **Platinum ware.**

2648

2649

2651

Dishes—Fused Silica

For Properties, see page 182

2648. DISH—Opaque Fused Silica, glazed throughout, "Vitreosil," not affected by rapid and extreme changes of temperature; with lip.

No.	1	3	5	7	9	10
Diameter, mm.	51	70	82	89	100	108
Depth, mm.	21	25	30	22	30	44
Capacity, cc.	25	45	80	90	100	200
Each	**1.35**	**1.50**	**1.65**	**1.85**	**2.15**	**2.50**

2648. DISH—Opaque Fused Silica, American Make, glazed throughout.

No.	1	3	5	7	9	10
Diameter, mm.	51	70	82	89	100	108
Depth, mm.	21	25	30	22	30	44
Capacity, cc.	25	45	80	90	100	200
Each	**1.20**	**1.35**	**1.45**	**1.60**	**1.90**	**2.15**

2649. DISH—Opaque Fused Silica, not glazed, "Vitreosil," the interior surface is, however, smooth and non-porous, and the dishes have the same valuable heat and acid resisting qualities as the glazed ware.

No.	11	12	13	15	17	19	21
Diameter, mm	137	130	152	152	178	178	203
Depth, mm.	57	63	63	76	70	95	82
Capacity, cc.	400	500	600	700	800	1200	1400
Each	**3.85**	**4.00**	**4.15**	**4.65**	**5.00**	**5.15**	**5.85**
No.	23	25	27	29	31	33	35
Diameter, mm.	203	229	229	311	394	458	458
Depth, mm.	108	89	120	133	102	178	216
Capacity, cc.	1800	1800	2500	3000	3000	15000	22500
Each	**6.65**	**7.50**	**8.35**	**12.50**	**15.00**	**17.75**	**19.00**

2649/1. DISH—Opaque Fused Silica, American Make, not glazed.

No.	11	12	13	15	17	19	21
Diameter, mm.	137	130	152	152	178	178	203
Depth, mm.	57	63	63	76	70	95	82
Capacity, cc.	400	500	600	700	800	1200	1400
Each	**2.50**	**2.65**	**2.80**	**3.10**	**3.30**	**3.45**	**3.85**
No.	23	25	27	29	31	33	35
Diameter, mm.	203	229	229	311	394	458	458
Depth, mm.	108	89	120	133	102	178	216
Capacity, cc.	1800	1800	2500	3000	3000	15000	22500
Each	**4.40**	**5.25**	**9.45**	**14.00**	**16.80**	**19.60**	**21.00**

2651. DISH—Opaque Fused Silica, flat, "Vitreosil," glazed throughout, with lip.

No.	1	2	3	4
Diameter, mm.	63	73	95	124
Depth, mm.	13	13	18	21
Capacity, cc.	20	30	75	150
Each	**1.50**	**1.65**	**1.85**	**2.50**

2651/1. DISH—Opaque Fused Silica, American Make, glazed throughout.

No.	1	2	3	4
Diameter, mm.	63	73	95	124
Depth, mm.	13	13	18	21
Capacity, cc.	20	30	75	150
Each	**1.35**	**1.45**	**1.60**	**2.15**

DISHES—Silica, Transparent, See Quartz.

2655–2658

2659

2662

2664

2653. **DISH—Opaque Fused Silica Capsule, "Vitreosil,"** especially adapted for ash determinations, ignitions, etc. The capsules are light and do not alter in weight.

No.	5	1	2	6	3	4
Diameter, mm.	35	44	51	57	60	70
Depth, mm.	13	13	13	13	13	16
Capacity, cc.	10	15	20	30	35	40
Each	.85	.85	1.15	1.15	1.35	1.65

2653/1. **DISH—Opaque Fused Silica Capsule, American Make.**

No.	5	1	2	6	3	4
Diameter, mm.	35	44	51	57	60	70
Depth, mm.	13	13	13	13	13	16
Capacity, cc.	10	15	20	30	35	40
Each	.70	.70	1.05	1.05	1.20	1.45

2655. **DISH—Opaque Fused Silica Capsule, "Vitreosil,"** for ashing coal, sugar and tannin analysis, capacity 40 cc., diameter 51 mm., depth 25 mm. **1.65**

2656. **DISH—Opaque Fused Silica Capsule, American Make,** same size as above **1.45**

2657. **DISH—Opaque Fused Silica Capsule, "Vitreosil," large size,** capacity 75 cc., diameter 82 mm., depth 25 mm. **1.65**

2658. **DISH—Opaque Fused Silica Capsule, American Make,** same size as above **1.45**

2659. **DISH—Fused Silica, Incinerating.** Dimensions are inside.

No.	7	20	23
Width, mm.	24	38	16
Depth, mm.	10	16	10
Length, mm.	56	48	63
Capacity, cc.	7	20	20
Each	1.35	1.35	1.65

2662. **DISH—Clay, Roasting, American Make.**

Diameter, inches	2½	3	4	5	6
Dozen	1.75	1.95	2.10	2.60	4.20

2663. **DISH—Silver,** price according to weight ..... **per gram** **.1[redacted]**

Diameter, mm.	50	65	75	90	100	125
Approx. weight, grams	45	75	100	125	175	320

2664. **DISH—Petri, low form,** the standard throughout the U. S. for general bacteriological work. Of best quality glass to withstand repeated sterilization. Fitted in pairs; diameter 100 mm., depth of lower dish 10 mm. ..... **per pair** **.[redacted]**
(For other sizes see No. 2665.) **per dozen pairs** **3.[redacted]**

2664A. **Ditto**—depth of lower dish 15 mm. ..... **per pair** **.[redacted]**
per dozen pairs **3.[redacted]**

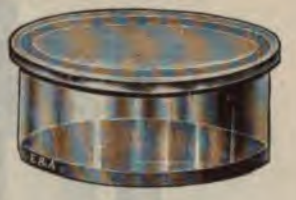
2664/1. **DISH—Petri-Pasteur,** thin and shallow; diameter 100 mm., depth of lower dish 7–8 mm. ..... **per pair** **.[redacted]**
per dozen pairs **3.[redacted]**

2664/2. **DISH—Petri; the bottom dish only,** diameter 95 mm., depth 12 mm., for use with porous earthenware covers ..... **per dozen** **1.[redacted]**

2664/3

2666

2666/1


2667/4
Nos. 0, 1, 2

2664/3. **DISH—Porous Earthenware Covers,** to fit 2664/2 Petri dish bottoms. The use of these covers eliminates spoilage of cultures due to condensation which collects on the glass top of Petri dishes and falls upon the colonies ..... **per dozen 1.50**
per 100 11.50

2664/5. **DISH—with glazed outer surface,** which reduces considerably evaporation of the water from the media; the covers are still sufficiently porous to absorb all water of condensation. See Jour. American Med. Ass., Vol. LXIII, p. 1031, Sept., 1914.
per dozen 2.00
per 100 15.00

2665. **DISH—Petri-Esmarch,** of best quality glass to withstand repeated sterilization. Fitted in pairs. Shape and style same as No. 2664.

Diameter, mm.	50	75	100	100	120	120	150
Height, mm.	10	15	10	15	15	20	25
Each	**.28**	**.28**	**.33**	**.33**	**.60**	**.60**	**.75**
Dozen pairs	**2.80**	**2.80**	**3.30**	**3.30**	**6.00**	**6.00**	**7.50**

2666. **DISH**—so-called **"Moist Chamber,"** of glass, with loosely fitting cover with knob.

Diameter, cm	15	20	25
Height, cm.	4	7.5	9
Each	**3.00**	**3.75**	**4.25**

2666/1. **Ditto—without knob on cover** **2.75 3.50 4.00**

2667/4
No. 3

2667/5

2667/11

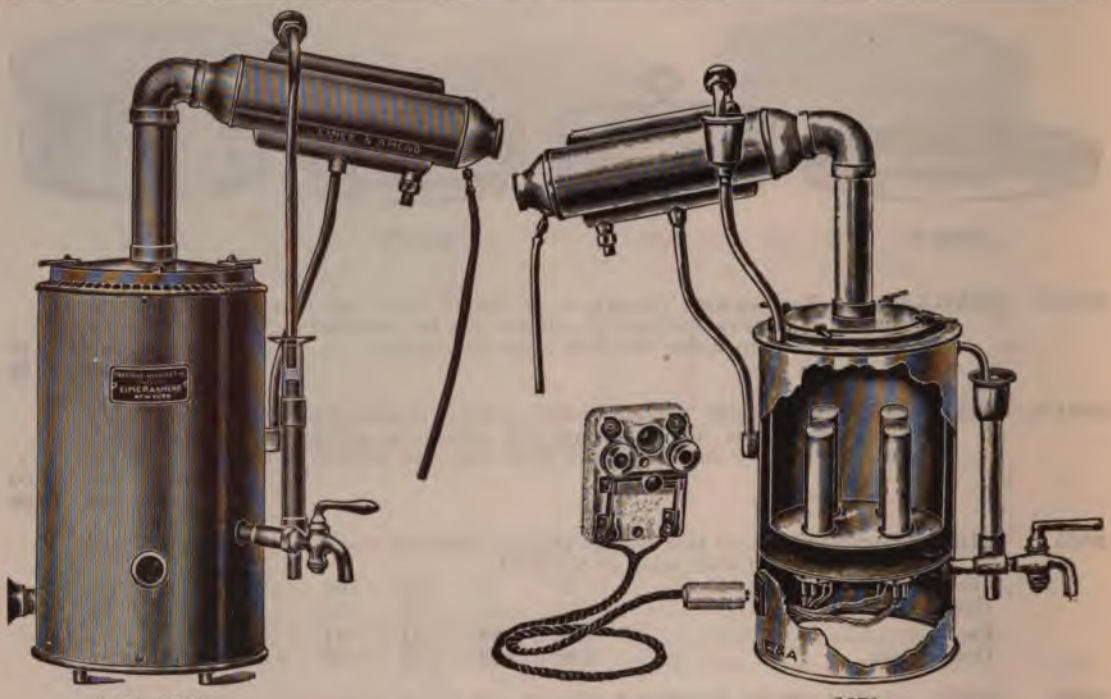
2667/4. **DISH—Stender form, of American glass,** with grooved covers ground.

No.	0	1	2	3
Diameter, mm.	36	50	60	60
Height, mm.	19	26	28	90
Each	**.18**	**.24**	**.34**	**.36**
Dozen	**1.90**	**2.55**	**3.50**	**3.70**

2667/5. **DISH—Staining, Glass,** with moulded stationary grooves, with well fitting cover; for 10 slides, 75 mm. long, width up to 38 mm. ..... **each .36**
dozen 3.80

2667/11. **DISH—Staining Jar, Coplin,** for 10 slides; of heavy glass with ground on cover, very practical and popular ..... **each .36**
per dozen 3.80
per gross 44.00

Dissecting Instruments, see **Bacteriological** Catalog, Section I.



2668–2669 2671

Barnstead Automatic Water Stills

Heated by Gas, Steam, or Electricity. (For Kerosene Still, see No. 2709/5.)

The product of these stills represents the highest degree of purity ever reached by any direct process of distillation. The operation is thoroughly effective, automatic and continuous, and produces water of the highest degree of purity free from ammonia and all gaseous and organic impurities, and at less cost per gallon than any other type. The construction is such that the heat generated in the still is used to preheat the incoming raw water. The boiler of the still is easily accessible for thorough cleaning by simply turning the thumb clamps which rigidly hold the condenser and hood to the boiler. The stills are compact—the gas and electric types are portable, and can be placed on the laboratory bench, or supported on bracket attached to the wall. Widely used in laboratories and for industrial purposes.

2668. **BARNSTEAD AUTOMATIC STILLS—Type L for heating with Coal or Natural Gas.** This type is recommended for continuous operation, as required in most laboratories, and for manufacturing purposes. It is equipped with Radial Burner incased under the boiler, which reduces the heat loss to a minimum. The stills are substantially built of heavy copper, nickel plated (5 and 10 gallon sizes, with galvanized casing), all parts that come in contact with the water are thoroughly coated with pure block tin, and are most easily cleansed. Using gas at the rate of $1.00 per 1,000 cubic feet, this still produces distilled water at the remarkably low figure of 1⅛ cents per gallon.

No.	70	72	74	75	76
Capacity per hour, gallons	1	1½	2	5	10
Each	**60.50**	**75.00**	**96.80**	**165.00**	**330.00**
2669. **Ditto—for heating by gasoline gas.** Same sizes, each	**63.00**	**77.50**	**99.30**	**167.50**	**332.50**

2671. **BARNSTEAD AUTOMATIC WATER STILLS—Type L, electrically heated.** This type is identical in construction with the gas heated type, except that the still is fitted with electric heating units instead of the gas burner. These heating units are so arranged in the boiler that they are surrounded with the water, thereby reducing the heat loss to a minimum. The units will last indefinitely if kept covered with water; they are, however, easily replaceable in case of need, which can be attended to by the operator. This is one of the exclusive features of the Barnstead Electric Still. **For 110 volts:**

Capacity per hour, gallons	1	1½	2	5	10
Consumption KW	2.4	4	6	12	24
Each	**75.90**	**96.80**	**121.00**	**297.00**	**580.00**
2673. **Ditto—for 220 volts:**	**75.90**	**96.80**	**121.00**	**297.00**	**580.00**
2675. **Extra Heating Units**—for above, Capacity gal.	1	1½	2	5	10
No. required for complete still	4	6	6	12	24
For either 110 or 220 volt, each	**6.50**	**6.50**	**9.00**	**9.00**	**9.00**

2680

2687

2680. **BARNSTEAD AUTOMATIC WATER STILLS—The Barnstead "Druggist" Automatic Water Still.** For heating with coal or natural gas. This portable and compact still is suitable for the intermittent requirements of druggists, photographers, etc., but for the continuous use as usually required in laboratories, type L is more desirable. The stills are made of rolled copper, thoroughly tinned on the inside and nickel plated. The heating is accomplished by a special Radial Gas Burner. Capacity ½ gallon per hour **31.80**

2681. **Ditto**—Capacity 1 gallon per hour **43.00**

2681/1. **Same as No. 2680,** but for heating by gasoline gas **34.30**

2681/2. **Ditto**—capacity 1 gallon per hour **45.50**

2681/3. **Same as No. 2680,** but electrically heated **42.00**

2681/4. **Ditto**—capacity 1 gallon per hour **56.20**
Please state voltage when ordering.

2684. **Extra Heating Units** for above Nos. 2681/3–4 (2 and 4 units resp. required for complete still, 110 or 220 volt) .....**each unit** **6.50**

2687. **BARNSTEAD AUTOMATIC WATER STILLS—Steam heated.** The steam stills are of slightly different construction to the gas and electrically heated stills, but the principle of operation is the same. They are constructed of heavy copper and composition, thoroughly coated with pure block tin on all parts that come in contact with the water. The outside finish is block tin with galvanized casing. The heating coil, which is easily detachable for the purpose of cleaning, is an annular coil of government composition; it is preferable to copper, requiring less space and having a much greater heating surface.

To obtain the listed capacity, steam pressure of from 30 to 60 pounds is required, but any higher pressure up to 150 pounds may be safely used—the higher the pressure the better will be the quality of the water, and the capacity per hour larger.

This type is most desirable for large laboratory purposes and manufacturing requirements, the cost of operation being but a fraction of a cent per gallon.

No.	63	84	85	86	88
Capacity per hour, gals.	1	2	5–7	10–15	15–20
Each	**72.60**	**104.50**	**154.00**	**220.00**	**330.00**
No.	90	92	94	96	97
Capacity per hour, gals.	20–25	25–30	50	75	100
Each	**412.50**	**522.50**	**700.00**	**900.00**	**1200.00**

2699

2701/2

2703

2699. **DISTILLING APPARATUS—Rochlitz Improved Automatic Water Still,** constructed entirely of heavy copper and brass and lined throughout with block-tin. The efficiency of the Rochlitz Still is due to the following: Scientific Construction, Asbestos lined Apron, Type of Burners used and Cone Shaped Asbestos Lined Bottle. For heating with **Artificial or Natural Gas.**

Capacity, gallons per hour	½	1	2
Gas Consumption, cu. ft.	10	20	35
Each	**35.00**	**50.00**	**100.00**

2701. **DISTILLING APPARATUS—Rochlitz Improved Automatic Water Still, steam heated type.** Attachable to any boiler.

Capacity, gallons per hour	1	2	3
Each	**75.00**	**100.00**	**155.00**

2701/1. **DISTILLING APPARATUS—Rochlitz Improved Automatic Water Still, Gasoline or Kerosene heated type.** Equipment furnished includes Pressure Tank, Pump, Gauge, Valves, Hollow Copper Tubing, Special Kerosene or Gasoline Burners, etc.

Capacity, gallons per hour	½	1	2
Each	**50.00**	**70.00**	**120.00**

2701/2. **Same as No. 2699,** but electrically heated, equipped with Westinghouse Bayonet Type Immersion Heaters.

Capacity, gallons	½	1	2
Each	**85.00**	**125.00**	**190.00**

When ordering specify voltage.

2703. **DISTILLING APPARATUS—Stokes Automatic Water Still,** bracket type for fastening to wall. **For gas of any kind.** Made of cast iron casting, both inside and outside. These stills are extensively used by reason of their durability, ease of cleaning and production of pure water at low cost.

Capacity per hour, gallons	½	¾	2¾
Each	**25.00**	**27.00**	**60.00**

2703/1. **DISTILLING APPARATUS—Stokes for liquid Gasoline,** capacity ½ gallon per hour **35.00**

2705. **DISTILLING APPARATUS—Stokes, with coil for Steam Heating.**

Capacity per hour, gallons	¾	2¾	5	10	25	60	100
Each	**30.00**	**75.00**	**150.00**	**200.00**	**300.00**	**500.00**	**750.00**

2705/1. **DISTILLING APPARATUS—Stokes,** equipped with **Khotal Kerosene Burner.**
Capacity ½ gallon per hour **35.00**

2708

2708. **BARNSTEAD HOME STILL—Operated on coal, gas, or oil stove.** Produces water of the highest degree of purity ever reached by any direct process of distillation, and in this respect far excels any natural spring water. It is, therefore, superior for medicinal and compounding purposes, or as a beverage. The stills are made of heavy copper and composition, thoroughly coated with pure block tin on all parts that come in contact with the water. Capacity, 1 quart per hour **15.00**

2708/1. **Ditto**—Nickel plated **16.00**

2709. **Same as No. 2708,** but capacity 2 quarts per hour **20.00**

2709A. **Ditto**—Nickel plated **22.00**

2709/1. **Same as No. 2708,** but electrically heated, heavy copper. Capacity, 1 quart per hour **20.00**

2709/2. **Ditto**—Nickel plated **21.00**

2709/3. **Same as No. 2709/1,** but capacity 2 quarts per hour **30.00**

2709/4. **Ditto**—Nickel plated **32.00**

2709/5. **DISTILLING APPARATUS—Barnstead Kerosene Oil Heated Still;** consumes about 1 quart of Oil per hour for each gallon of distilled water produced. It is automatic in operation and very satisfactory. Still complete with burner.

Capacity per hour, gallons	½	1	1½	5
Each	**36.00**	**48.00**	**60.00**	**247.50**

2710

2712

2710. **DISTILLING APPARATUS—For water, spirits, etc.,** retort of heavy copper, tin lined, with removable head; zinc condenser with pure block tin condensing worm.

Capacity, gallons	½	1	2	3	5
Each	**16.65**	**22.00**	**28.00**	**36.75**	**48.00**

2712. **DISTILLING APPARATUS**—For **water, steam heated,** of heavy polished copper with steam coil near bottom; automatic valve controlling water supply; complete with water level gauge, etc.; capacity about 4 gallons per hour under 20 lb. steam pressure **64.75**

2714. **Ditto**—Capacity about 6 gallons per hour under 20 lbs. steam pressure **84.00**

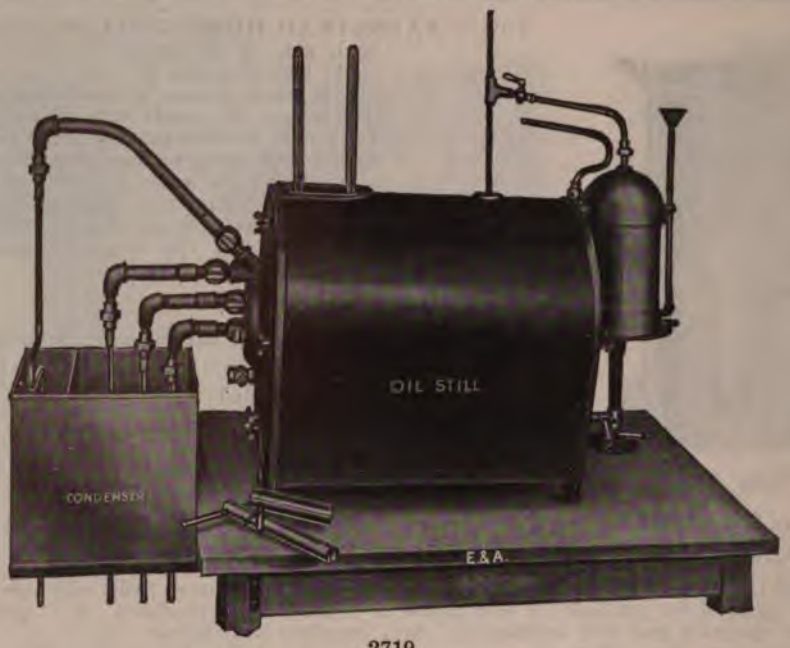
2716. **DISTILLING APPARATUS—For heavy oils, and other liquids or solids requiring a high heat.** The distillation may be made by live steam or by direct heat, with or without agitation by hot air blown through as desired. Made of heavy copper with brass fittings; capacity ½ gallon. For cut, see bottom of next page **23.75**

2718. **Ditto**—For cut, see bottom of next page.

Capacity, gallons	1	2	3	5
Each	**38.50**	**52.50**	**66.50**	**78.75**

2718a. **Oil trap,** extra **2.00**

2718b. **Drip-cock,** welded on side of bottom, extra **9.50**



2719

2719. **DISTILLING APPARATUS—The Brown Oil Still.** Intended for fractionation and general distillation. Made of cast iron and surrounded with cast iron frame. Still and frame are mounted within a fire-brick furnace. The flame from the Bunsen Burner plays between the frame and the fire-brick furnace. The Still in this way is heated indirectly through the walls of the iron frame surrounding it. The ends of the Still are protected from draughts and excessive radiation by cast iron doors, lined with thick asbestos. The flame can be adjusted so as to keep top and bottom of Still at same temperature, or so that top is at a higher or lower temperature than the bottom. Two large Bunsen Burners are required; one for heating the Still and one for generating steam. The pipe leading from the steam generator to the Still is heated by a special tube burner with small jets, which superheats the steam.

The Still has a capacity of one gallon (half full). The outfit includes a steam generator and a steam superheater, also three thermometers; one for taking temperature of the steam entering the Still; one for taking temperature of the oil in the Still, and the third for taking temperature of the vapor.

Price		**210.00**
Extra Thermometers for above, two about 650° F.	each	**4.50**
one about 400° F.		**2.00**

For further details, see special Bulletin A. 104.

2716

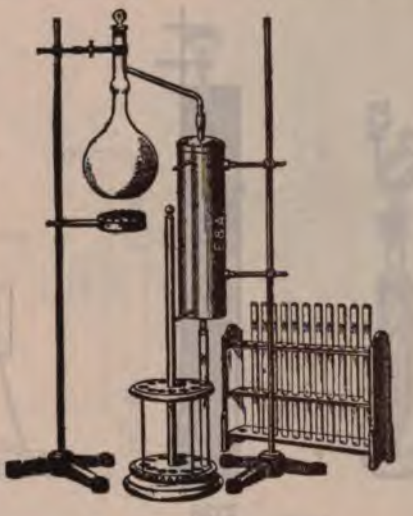
2720

2718

2720. **DISTILLING APPARATUS—For solids and liquids,** made of extra heavy copper, all seams brazed, for high temperatures; flanges secured by heavy thumb screws; easily cleaned.

Capacity, gallons	½	1	2
Each	**47.25**	**52.50**	**70.00**

2721



2722

2724

2721. **DISTILLING APPARATUS—Gramercy.** Heavy sheet copper, block tin lined throughout and mounted on a substantial brass and iron stand. This is a convenient portable still which can be used for the distillation of oils and volatile liquids. Capacity about one quart. A good size for experimental laboratory work. Price, complete with stand and alcohol lamp..... **26.25**

2721/1. **Ditto**—Set in fine oak box mounted on iron base, ready for field work. Price complete **40.00**

2722. **DISTILLING APPARATUS—For the determination of ammonia in water;** consists of a glass stoppered distilling flask, capacity 2 liters, clamp for same, copper condenser with block tin condenser tube and two clamps; iron stand, gas burner, revolving rack for 12 Nessler tubes, and comparison rack; complete with set of 12 Nessler tubes 50 cc. high form **38.00**

Separate Parts

a.	Distilling Flask	**2.50**	d.	Revolving Rack	**4.00**
b.	Burner	**2.50**	e.	Nessler Tubes	**12.60**
c.	Condenser	**9.65**	f.	Comparison Rack	**4.00**

2724. **DISTILLING APPARATUS—For the determination of ammonia in water.** The connecting tube is provided with an inlet to allow of permanganate solution being easily poured into the flask, after the free ammonia has been distilled off; mercury seal connection with condenser insures a perfect joint, which is easily disconnected **8.00**

2725

2725. **DISTILLING APPARATUS —Pyrex Glass,** coil condenser, ground glass connection and stopper.

Cap. of flsk, cc.	500	1000	2000
Each	**17.00**	**19.50**	**22.50**

2726. **DISTILLING APPARATUS —Salleron,** for determining the percentage of alcohol in wine, beer, cider, etc.* Made of stout copper; complete with spirit lamp, hydrometer 0–40, therm. and grad. glass **16.50**

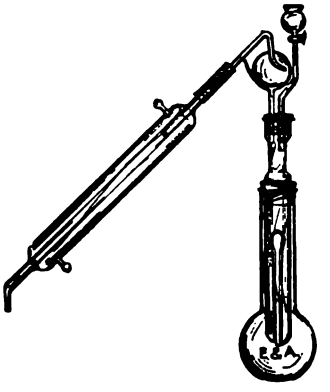
Hydrometer only, 0–40° in single degrees, Tralle **1.50**

Special Hydrometer, for above, 0–10° in ½°, Tralle **1.50**

Special Therm., for above **1.75**

*See also **Alcoholometer, Juerst,** No. 119.

2726



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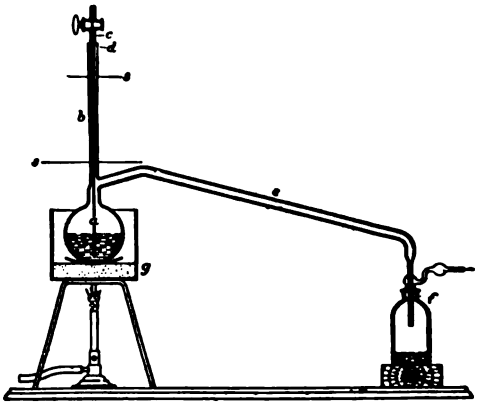


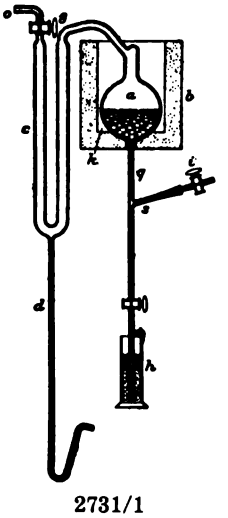
2731

2727. **DISTILLING APPARATUS—Hortvet,** for determining total, fixed, and volatile acids in wines or vinegars **8.50**

2728. **DISTILLING APPARATUS—Karsten,** for purifying mercury, with arrangement for purifying in nitric acid; complete on stand **40.00**

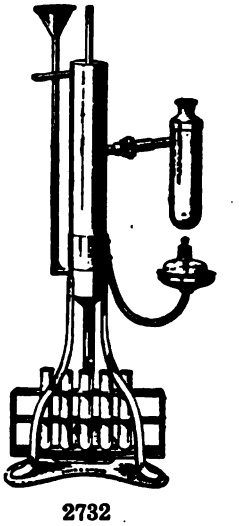
2730. **Glass parts only** for above **20.00**

2731. **DISTILLING APPARATUS—Hulett,** for purifying mercury, **gas heated,** consisting of a round bottom flask holding 500 cc. with sealed in neck and side tube which is sealed to a stopper of an ordinary drexel washing bottle. Glass parts only..... **12.00**



2731/1

2731/10



2732

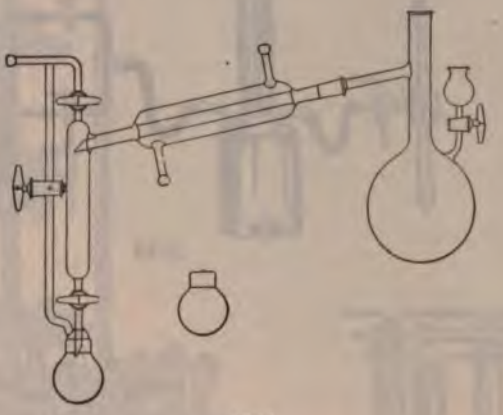
2731/1. **DISTILLING APPARATUS—Hulett, Electrically heated,** for distilling large amounts of mercury, and arranged to permit mercury being introduced into the still during the distillation. Glass parts only, without electric heater b **20.00**

Regarding method of operation of No. 2731 and No. 2731/1, see Bulletin No. 42 of the U. S. Bureau of Mines.

2731/10. **MERCURY PURIFYING FUNNEL**—A funnel ending in a capillary, hung in the mouth of a tube provided with a mercury-seal trap 36" long. A fine stream of mercury is thus allowed to fall through dilute nitric acid, the purified mercury being caught as it flows out of the trap **1.50**

2732. **DISTILLING APPARATUS—Regnauld,** for fractional distillation of small quantities of liquids. Made of copper and brass with glass alcohol lamp, holder and sliding rack fitted with glass tubes; without thermometer **60.00**

2733



2734

2733. **DISTILLING APPARATUS**—for carrying on as many as six distillations at one time, for experiment stations and other large laboratories. Adapted to Kjeldahl distillation, Leffmann and Beam, and Reichert butter methods, wine and spirit determinations, etc. This is a very convenient apparatus, occupying only 15 inches square of table room. It is substantially made, the condenser of copper, with block tin tubing, gas connections, adjustable burners and ring supports. Extreme height of the apparatus is 44 inches **78.75**

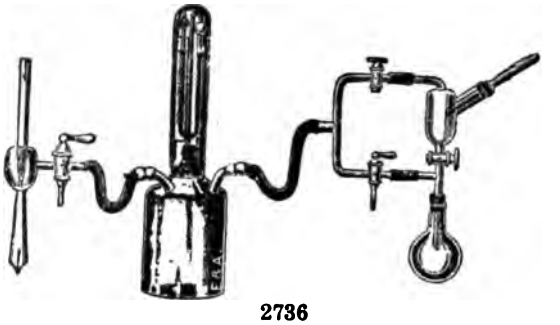
2735

2734. **DISTILLING APPARATUS**—**Vacuum, Axtell,** for fractional distillation under diminished pressure; all ground joints, complete with one extra flask.. **16.00**

2735. **DISTILLING APPARATUS**—**Vacuum,** of iron, porcelain lined, capacity to flange of dome 10 gallons, complete with mixer, including tight and loose pulley as per cut **325.00**

2735/1. Ditto—but without mixer **195.00**

2735/2. **DISTILLING APPARATUS**—**Vacuum,** similar to 2735, but two gallon capacity **210.00**



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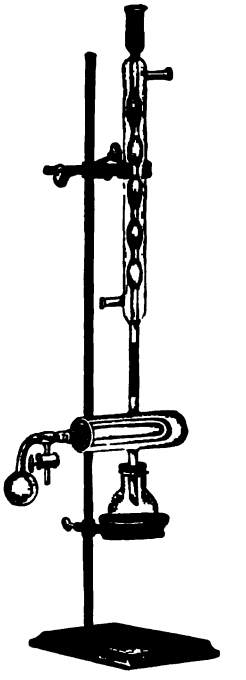

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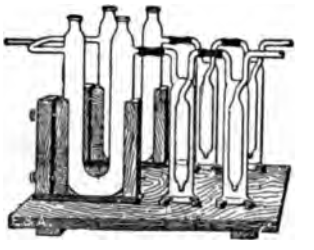


2752

2754

2736. **DISTILLING APPARATUS—Vacuum, Kolbe,** for fractional distillation under diminished pressure, complete as illustrated **25.00**

Receivers—for distillation in vacuo, see Receivers.

2744

2744. **DISTILLING APPARATUS—Vacuum.** Consists of a flat bottom porcelain dish 6½ inches diameter, 2⅜ inches deep, with ground rim on which the tubulated glass dome fits tightly; without thermometer **20.00**

Distilling Apparatus—Kjeldahl, see Nitrogen.

Distilling Apparatus—Vacuum Enameled Iron, see **Retorts.**

Distilling Tubes, see Tubes.

Draft Gauges, see Manometers.

2750. **DRYING APPARATUS—Bennert,** for organic analysis, with 4 drying jars mounted on board as illustrated **12.00**

2752. **DRYING APPARATUS—Tauber,** complete with drying tubes and jars, mounted as illustrated **18.50**

2754. **DRYING APPARATUS—Vacuum, Abderhalden improved.** Especially suitable for substances containing water of crystallization, which is separated with difficulty. To maintain constant temperature, liquids with the requisite B. P. can be used, for instance 80° Alcohol, 105° Toluol, 130° Xylol, 150° Cumol. Complete as illustrated, with condenser, flask, stand, etc. **11.50**

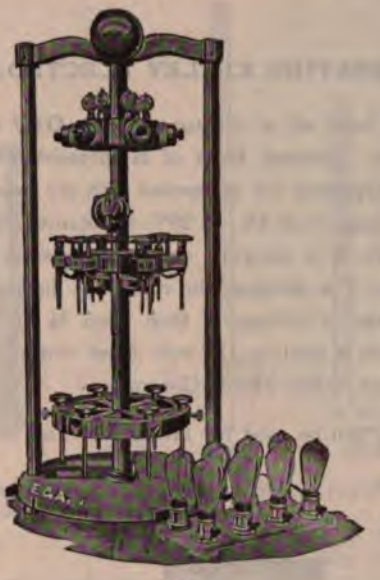
2756. **Vacuum Drying Tube and Jacket** only, with phosphorus pentoxide bulb, stopcock, etc., for above **7.50**

Drying Jars and Tubes—see **Tubes.**

Drying Ovens—see **Ovens.**

Ebullioscope—see No. 119.

Electrical Apparatus—see separate headings.



2759

Kimley Electro-Analysis Apparatus

For the Rapid Determination of Copper, Tin, Lead, Zinc, Etc.

The stand is composed of three circular aluminum castings mounted on nickel-plated steel tubing, so as to permit the stand to be turned through 180 degrees in either direction. The upper of the circular castings carries six resistance lamps. These are above 6-volt, with a carrying capacity of about 4 amperes. Each lamp has in series with it a switch, also mounted on the same casting.

The center circular casting carries the electrode holders, a switch to short circuit the electrode holders and to change the polarity of the electrodes to meet certain conditions explained in the Analysis Methods. Each lamp on the upper casting is in parallel with the electrodes under it on the center casting, so as to take up the current carried by the solution under analysis when the solution is lowered so that the electrodes are out of contact with it. Otherwise, an open circuit would be produced which would spoil any other analysis on the stand at the same time. There is also mounted on the center support, between the two upper castings, a motor for revolving the electrodes. The lower circular casting serves only to carry the support for the electrolytic beakers.

The oil-hole in center of pulleys at top of revolving spindles must be kept moist with oil, also the lower bearing of the same spindles.

2759. **ELECTROLYTIC ANALYSIS APPARATUS—Kimley,** complete, not including glassware nor platinum electrodes **350.00**

Beakers used with apparatus. Pyrex, No. 717, 100 cc.

Platinum Electrodes suggested.

2759a. **6 Gauze Electrodes** (anodes), 2x½", approx. weight 11.5 grams each, total weight 69 grams.

2759b. **6 Ditto** (cathodes), 2x1½", approx. weight 25 grams each, total weight 150 grams. Weight of the 12 electrodes approximately 219 grams to be charged at market price of platinum.

For Copper Analysis, copper cathodes can be used.

Bulletin No. 206, giving exact directions of method of operation supplied on request.

See also directions on next page.

DIRECTIONS FOR OPERATING KIMLEY ELECTRO-ANALYSIS APPARATUS

Before connecting apparatus, have all of the top switches **OFF** and place lamps in sockets on top of apparatus above these switches. Connect Bank of lamp resistance to line (110 volt **direct current only).** Switches on top ring of apparatus are connected with the resistance and are for varying the voltage. When No. 1 is showing, a range from 5V. to 20V. is obtained, by switching on, or off, the lamps in the bank of resistance. When No. 2 is showing, current is passing through the lamp only, and not through the electrodes. When No. 3 is showing, the current is flowing through top lamp, Bank of resistance, and electrodes and the range of voltage is then from ½ to 5. Bottom switches are for pole-changing electrodes. The apparatus is used on 110 volt direct current only; if only a. c. current is available motor generator must be used. (See Motor Generators.)

Motor for rotating electrodes can be used for **110** or **220** volt direct or alternating current.

Advise current when ordering.

2761

2761. **ELECTROLYTIC ANALYSIS APPARATUS—Braun.** The apparatus is equipped with a motor and each unit is driven by a special friction device enabling the operator to use either one, two, three or more units at one time. Revolving loop anodes and gauze cathodes are used. The speed is regulated by a rheostat. A separate rheostat controls the current supplied to the individual units included in outfit.

For instructions with regard to current, see Kimley Apparatus No. 2759.

Units	2	4	6
Price without platinum electrodes	**160.00**	**213.00**	**265.00**

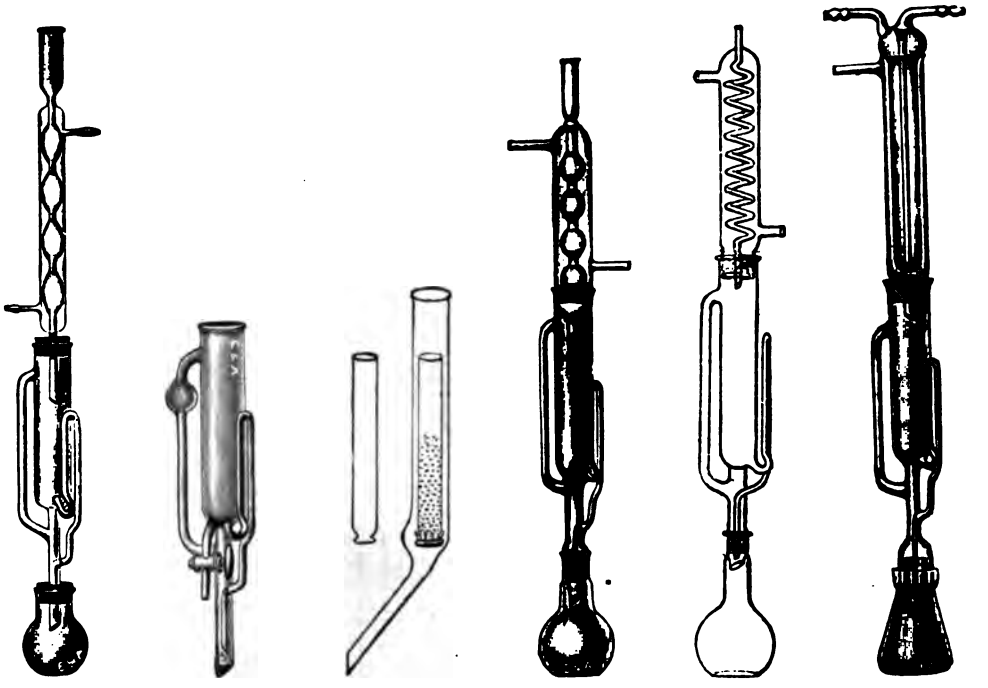
The price of the platinum electrodes varies with the market.

Approximate weight:

Anodes: Platinum loop (high form), about 5 grams each.

Cathodes: Gauze electrode 2x1", about 10 grams each.

Complete instructions for mounting and operating are furnished with each outfit.



2792 2794 2795 2796 2797 2798

2794. **EXTRACTION APPARATUS—Soxhlet,** with stopcock on side.

Size	small	medium	large
Each	**5.10**	**5.70**	**7.30**

2794/1. **Ditto—Pyrex glass** ..... **prices on application**

2795. **EXTRACTION TUBE—Johnson,** for the determination of fat in milk, well suited also for extracting the crude fat from vegetable material. Provided with inner tube, one end securely fastened .....

2796. **EXTRACTION APPARATUS—Soxhlet,** with 2 flasks, extractor, and Allihn Condenser; all ground joints.

Size	small	medium	large
Inside diameter, mm.	30	38	50
Each	**6.55**	**8.60**	**11.25**

2796/1. **Ditto—Pyrex glass** ..... **prices on application**

2797. **EXTRACTION APPARATUS—Soxhlet,** with 2 flasks and Graham's spiral condenser, all ground joints.

Size	small	medium	large
Inside diameter, mm.	30	38	50
Each	**7.85**	**10.60**	**14.50**

2797/1. **Ditto—Pyrex glass** ..... **prices on applicatio**

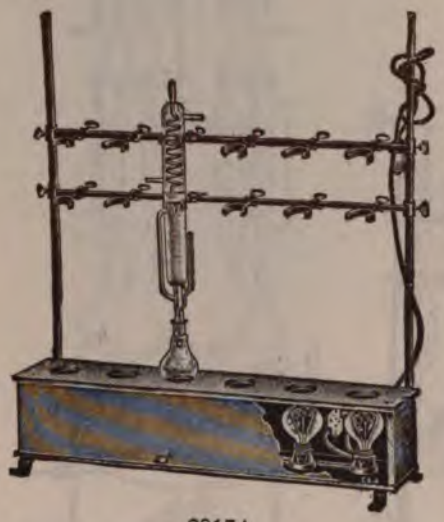
2798. **EXTRACTION APPARATUS—Soxhlet,** with Hopkin condenser, ground joint, an Sy flask for mercury seal. An ideal combination of ether tight joints.

Size	small	medium	lar
Each	**7.25**	**9.00**	**11.**

2798/1. **Ditto—Pyrex glass** ..... **prices on applicati**

2800. **EXTRACTION APPARATUS**—with Knorr Flasks, same sizes and prices as No. 2'

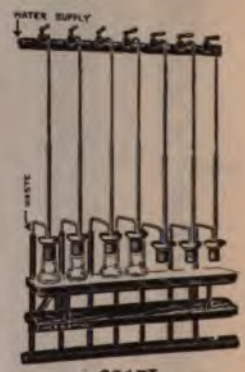
2800/1. **Ditto—Pyrex glass** ..... **prices on applica**



2817A

2817F

2817K



2817L

The use of electricity as a heating medium for extraction apparatus, especially with inflammable solvents, is recognized as most desirable, it being cleanly and safe.

The Gramercy Electric Extraction Apparatus consists of a set of six electric lamps (or hot plates), each with individual snap switch (so that no more than are actually required in service at one time need be used), encased in a box support made of fire-proof asbestos wood, having holes over each lamp smaller in diameter than the flask used. The box support is equipped with iron uprights, supporting two horizontal metal rods, adjustable in height, to which are fitted adjustable spring clamps for each extractor and condenser.

2817A. **EXTRACTION APPARATUS—Gramercy Electric,** complete with 6 lamps, connecting cord and plug; with glass parts **50.00**

2817B. **Ditto**—with 6 electric hot plates 4½ inches in diameter (in place of lamps), each provided with individual switch; with connecting cord and plug **90.00**

2817C. **Ditto**—with 6 electric hot plates 4½ inches in diameter, each one provided with three heats; with connecting cord and plug **115.00**

2817F. **EXTRACTION APPARATUS—Revolving, electrically heated,** with copper condenser. The tank of the condenser is adjustable in height so that almost any style of glass extractor can be accommodated—the minimum distance obtainable between bottom of tank and electric hot plate is 15 inches, the maximum is 24 inches. The temperature of the hot plate normally is high enough to volatilize the highest boiling point solvent generally used in fat extraction work; where selective temperatures are required small discs of asbestos may be placed on the hot plate under the flasks. Arranged for 110 volts and 220 volts alternating and direct current. For 6 extraction apparatus, without glassware. **Please state voltage when ordering...** **60.00**

Bailey-Walker Extraction Apparatus

Advantages

1. An inexpensive, durable and efficient condenser, which may be adapted to practically any form of continuous extraction apparatus.
2. The elimination of all rubber, corks, ground glass or mercury seal connections.
3. Extractions may be safely run over night, since there is practically no danger of breakage due to change in water pressure.
4. The flask is light enough to be accurately weighed; it is easily cleaned, and of such form that all of the extract can be transferred.

The above illustration shows a convenient and compact manner of connecting the condensers with the water supply and waste pipe. The small tube entering the inlet tube of the condenser should be of copper preferably, and ⅛ inch outside diameter. The iron pipe which receives the outlet tube should be ¾ inch in diameter and of such height that the bottom of the condenser will not touch the heating plate when the flask is removed. For listing, see next page.

BAILEY-WALKER EXTRACTION APPARATUS—Continued.

The apparatus is compact—seven of them can easily be accommodated on an electric hot plate 24x4½ inches. If this type of plate is used, it should be fitted with three heats, the high heat so arranged that it will not ignite ether.

2817J. **EXTRACTION APPARATUS—Bailey-Walker,** consisting of glass flask, metal condenser and glass syphon **4.50**

2817K. Ditto—with 25 cc. Gooch crucible in place of glass syphon. For cut, see preceding page **4.50**

2817L. **EXTRACTION APPARATUS—Bailey-Walker,** complete as shown, consisting of 7 metal condensers and 7 sets glass parts with either syphon or crucible, complete with hot plate frame and water supply with 7 stopcocks and overflow pipe. For cut, see preceding page **85.00**

2817M. **Metal Condenser** only for above **3.25**

2817N. **Glass Flask** only ..... **.65**

2817P. **Glass Syphon Tube** only ..... **.65**

Hot Plate for above, 24x4½", 3 heat, see No. 3888.

2817/1

Pickel Extraction Apparatus

EXTRACTION APPARATUS—according to **Dr. J. M. Pickel, of North Carolina State Department of Agriculture.** See Jour. of Ind. & Eng. Chemistry, Nov. 1, 1919, consists of Metal condenser with eccentric drip point, glass jar, ether recovery cup with funnel, Special Alundum crucible and receiver for fat. It is compact and economical. Twenty of these outfits can be accommodated at one time on an electric hot plate 24" long by 4½" wide.

It is easy to raise and lower the condensers for the admission and removal of the cylinders. Practically all of the ether condenses on the lower quarter inch of the condenser. Low heat of the electric heater is usually adequate. The glass cylinders are 5¼" by 1 5/16" in diameter inside and weigh 40 to 50 g. Smaller cylinders to set inside the larger may be used if desired. These smaller cylinders are 1⅞" high by 1 7/16" diam. inside and weigh 14 to 18 g. For additional information, write for special bulletin.

2817/1. Extraction Apparatus, Pickel, as above described, consisting of one each—metal condenser a, glass cylinder b, ether recovery cup c, and crucible d. Price complete **18.50**

a. Condenser only **15.00**
b. Glass Cylinder, regular size **1.25**
bb. " " small " **1.00**
c. Ether recovery cup only **2.50**
d. Crucible (alundum) only ..... **.80**

Hot Plate for above 24" long by 4½" wide, 3 heat multiple unit type, see No. 3888.

Water connections for outfit consisting of twenty sets to operate in connection with above hot plate. Extra ..... **price on application**

2818. **EXTRACTION APPARATUS—Landsiedl.** A very simple apparatus to operate; the extraction takes place at nearly the boiling point of the solvent. For the extraction of solids, vessels A and B are used; for liquids lighter than the solvent, vessel C, and for liquids heavier than the solvent, vessel D.

Size	medium	large
Capacity of inside tube, cc.	100	200
For extraction thimble, mm.	33x80	43x123
With inner tube A, only	**12.00**	**15.00**

2818A. Inner Tube A, only **1.50**

2818B. Inner Tube B, only **1.50**

2818C. Inner Tube C, only **1.50**

2818D. Inner Tube D, only **1.25**

2821/1. **EXTRACTION TUBE**—for fat, **Rohrig,** Rose-Gottlieb method, **ungraduated** and unstoppered, with polished wooden base with indentation for flask, without flask..... **4.00**

2821/2. **Ditto—graduated** **5.00**

2822. **EXTRACTION APPARATUS—Bremer,** for the extraction of liquids by means of substances which are of lighter Sp. Gr. than those used for dissolving the material to be extracted.

For solution, cc.	10	25	50
Each	**3.50**	**4.10**	**5.40**

2824. **EXTRACTION APPARATUS—Graefe.** Complete with support, as illustrated..... **8.50**
With this apparatus the substance to be extracted is constantly exposed to the vapors of the solvent itself, which runs back from the condenser, thereby facilitating rapid extraction.

2826. **Ditto**—without support **6.30**

2828. **EXTRACTION APPARATUS—Hagemann,** for liquids **15.00**

2830. **EXTRACTION APPARATUS—Kreussler,** with inside condenser and 3 flasks ground on **5.50**

2832. **EXTRACTION APPARATUS—Cauldwell,** extraction tube only with perforated bottom; sealed into glass jacket **1.50**

2834. **EXTRACTION APPARATUS—Glass Tube, with syphon.**

To syphon, cc.	25	50	100
Each	**.90**	**1.20**	**1.65**

EXTRACTION TUBE—for **oils, Muter tube,** see No. 4786.

2836 2838 2840 2846 2847 2849

2836. **EXTRACTION APPARATUS—Kutscher & Stendel.** This apparatus is very rapid and efficient, on account of the distance the ether must travel through the liquid following the spiral, before returning saturated to the conical flask. The condenser, not illustrated, is charged extra according to selection.

Capacity, cc.	500	1000	2000
Each	**7.80**	**9.00**	**11.00**

2838. **EXTRACTION APPARATUS—Thorn,** with ground joint condenser.

Size	small	large
Each	**3.50**	**5.00**

2840. **EXTRACTION APPARATUS—Wiley,** consisting of a nickel-plated metal condenser with suspended porcelain Gooch crucible, fitted to a glass tube with ground flange. This simple and effective apparatus eliminates stoppers and connections, and permits a double weighing, both of the residue and extracted matter **7.50**

2842. **Metal Condenser** only **6.25**

2844. **Glass Tube** only, with ground flange **1.25**

2846. **EXTRACTION APPARATUS—Wiley-Soxhlet, modified by Ford** (Jour. Am. Chem. Soc., April, 1912), for use with such solvents as alcohol, acetone, or chloroform. A compact, convenient apparatus, free from seals and ground connections, the separate parts of which are readily accessible for cleaning, etc. **2.40**

a. **Syphon** only ..... **.70**

2847. **EXTRACTION APPARATUS—Underwriter's Laboratories' pattern** (Jour. of Ind. & Eng. Chem., Vol. 4, No. 7, June, 1912); rapid and convenient for use with rubber compounds, etc. The apparatus consists of a short metallic spiral tube reflux condenser, with wide long neck conical shape flask, and suspended **glass syphon tube,** as illustrated **3.65**

a. **Condenser** only **2.75**

b. **Flask** only ..... **.30**

c. **Syphon** only ..... **.70**

2847/1. **EXTRACTION APPARATUS**—same as 2847, but with suspended porcelain **Gooch crucible** complete **3.40**

a. **Crucible** only with holes ..... **.36**

2847/2. **EXTRACTION APPARATUS**—for the Insoluble Test of Shellac (same illustration as No. 2847) complete **7.50**

a. **Flask** only **1.00**

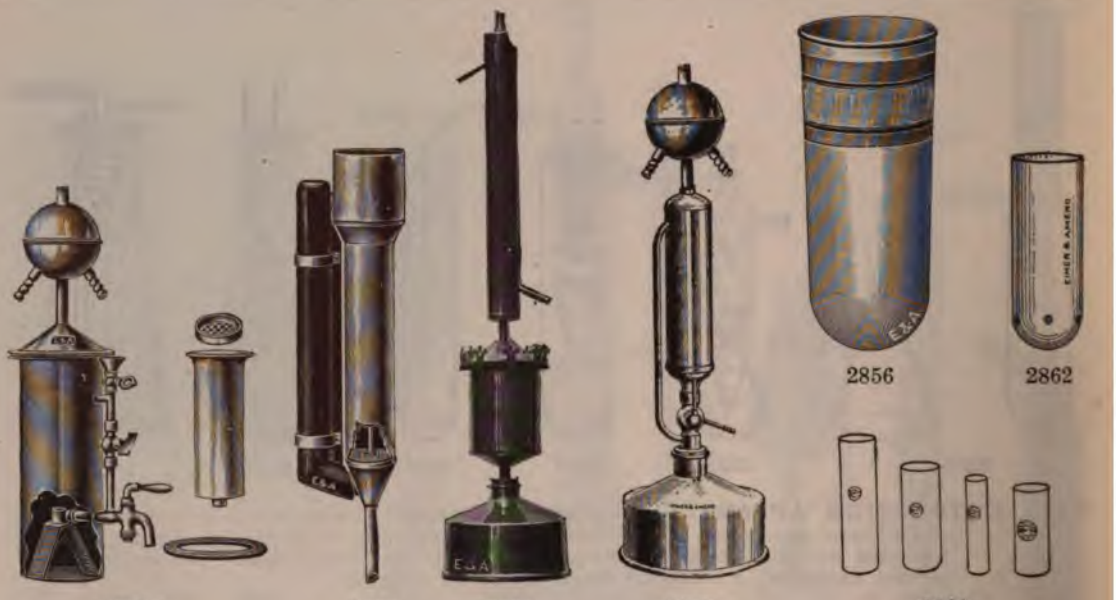
b. **Syphon** only **1.00**

2849. **EXTRACTION APPARATUS—For Rubber Analysis,** similar to No. 2847 but of special dimensions, as recommended by the Joint Rubber Insulation Committee as described in the Journal of Industrial & Engineering Chemistry, January, 1914. Complete **3.65**

a. **Condenser** only **2.75**

b. **Flask** only ..... **.32**

c. **Syphon** only ..... **.70**



2850 2852 2854 2855 2856 2860 2862

2850. **EXTRACTION APPARATUS—Reed,** for bark and wood extracts. Compact, efficient; preferred by many leather chemists; made of stout polished copper, with ball condenser; complete as illustrated **52.50**

2852. **EXTRACTION APPARATUS—Davoll** (Jour. of Ind. & Eng. Chem., Vol. 5, No. 4, Apr., 1913), for the determination of sucrose and fiber simultaneously in sugar cane, cane bagasse, sugar beets, etc. This apparatus extracts refractory bagasse completely with 40% alcohol in half an hour. Instant and qualitative removal of fiber by inner diaphragm. The apparatus accommodates full normal weight bagasse. Made of heavy copper, nickel plated **16.00**

2854. **EXTRACTION APPARATUS—Yocum,** in general use by tanning chemists. The flask of heavy copper, capacity one quart, is fitted with a copper extractor ground in, and brass condenser **38.50**

2855. **EXTRACTION APPARATUS—Teas,** flask of heavy copper, one quart capacity, fitted with copper extractor ground in; with condenser No. 2270 ..... **33.00**

2856. **EXTRACTION SHELLS—Paper,** of fat free paper, for use with Soxhlet and other extraction apparatus. Can be used repeatedly.

Length, mm.	50	90	80	80	100	60	80	94	123
Diameter, mm.	10	19	22	25	25	26	33	33	43
Per box of 25	**3.15**	**3.15**	**3.15**	**3.55**	**4.40**	**3.15**	**3.55**	**4.40**	**7.10**

2858. **Ditto—Double thickness;** will not permit the finest substances to pass through.

Length, mm.	50	90	80	80	100	60	80	94	123
Diameter, mm.	10	19	22	25	25	26	33	33	43
Per box of 25	**5.28**	**5.28**	**5.28**	**5.92**	**7.36**	**5.28**	**5.92**	**7.36**	**11.84**

2860. **EXTRACTION SHELLS—Alundum,** can be used repeatedly; easily cleaned by ignition.

Height, mm.	90	70	60	80	100	55
Diameter, mm.	19	25	26	30	34	35
Shape at bottom	Flat	Flat	Round	Flat	Round	Flat
Each	**.69**	**.81**	**.69**	**.86**	**1.04**	**.92**

2862. **EXTRACTION SHELLS—Glass,** easily cleaned, can be used repeatedly.

Length, mm.	80	80	123
Diameter, mm.	22	33	43
Each	**.50**	**.60**	**.85**

N. B. Any size made to order.

FERMENTATION—Tubes, see **Tubes.**

FIGURES—Steel, see Dies.

2864. **FILE—Round,** with fine point; best quality.

Size, inches	4	5	6	8
Each	.22	.23	.25	.30

2866. **FILE—Triangular,** best quality; for cutting glass tubes, etc.

Size, inches	3	4	5	6	8
Each	.15	.16	.18	.23	.38

2868. **FILE HANDLES**—Best quality ..... .10

Filters

2869 2870 2876

2869. **FILTER—Gravity Stoneware.**

	No. 1	No. 3	No. 6
Filtering disc	7″	9″	11″
Top vessel to hold, qts.	5	12	24
Bottom vessel to hold, qts.	7	17	30
Capacity per day, gals.	2–3	4–8	10–14
Each	4.50	8.25	16.00

2969a. **Jars,** only for above filter ..... each .75 .95 1.50

2870. **FILTER—Berkefeld House Type H5,** nickel plated, for attaching to any regular ¾ inch hose bib faucet. Length 5½ inches; diameter 2½ inches; capacity 1 gallon in 6 minutes at 40 pounds pressure 4.50

2870a. Hose end to attach filter to any plain bib ..... .50

2870b. Extra filtering cylinder 1.25

2872. **Ditto—Downward,** with arrangement so that unfiltered water can be drawn without removing the filter from faucet 6.50

2874. **FILTER—Berkefeld House Type H2,** upward, similar to No. 2870, but larger; length 6½ inches, diameter 2¾ inches, capacity 1 gallon in 4 minutes at 40 lbs. pressure 5.50

2874a. Hose end to attach filter to any plain bib ..... .50

2874b. Extra filtering cylinder 1.75

2876. **Ditto—Downward,** with arrangement so that unfiltered water can be drawn without removing the filter from faucet 7.50

2877. **FILTER—Berkefeld House Type H2 B,** upward, always up out of the way. Filtered or unfiltered water can be drawn by turning handle of Two-way Cock, complete ... 11.50

2877a. Extra filtering cylinder 2.50

2882

2883

2884

2883/1

2882. **FILTER—Berkefeld House Type H3,** all brass, nickel plated, capacity 1 gallon in 2 minutes 20.00

2882a. Extra filtering cylinder 3.00

2883. **FILTER—Berkefeld Army Type No. 4.** With this type the filter is placed in a bucket of unfiltered water or in a stream, and by working the pump, filtered water runs out of the small pipe at the top. Filter body 18 inches over all height, 5x5 inches wide, stump 14 inches high. The stump and intake tube are detachable, allowing the entire apparatus to be packed in a small box. Capacity ½ gallon per minute; weight complete, 8 pounds 30.00

2883a. Extra cylinders ..... each 4.00

2883/1. **Ditto—Type No. 3,** same style as above but smaller. Capacity 1 quart per minute. Height, 14 inches by 3x2 inches wide. Weight, 3 pounds 15.00

2883/1a. Extra cylinders ..... each 3.00

Berkefeld Laboratory Filters

Used for sterilizing all liquids, and completely filtering infusions, etc., containing bacteria. They yield a clear blood serum free from microbes, and from milk a perfectly clear and colorless milk serum, free from fat. *The following prices are for cylinders and glass mantles only.*

For Flasks if required, see No. 3090.

2884. **FILTER—Exhaust Pump**—Style as shown in illustration 7.00

2886. **FILTER—Cylinders.** For cut, see next page.

No.	Length	Diameter		
1	10 inches	2 inches	Metal Headpiece	5.00
2	8 inches	1 inch	Metal Headpiece	4.50
3	2½ inches	⅝ inch	Metal Headpiece	3.00
5	¾ inches	⅝ inch	Metal Headpiece	2.50
13	5 inches	1 inch	Metal Headpiece	4.00
20	2¼ inches	1 inch	Metal Headpiece	3.25

2886

2888. **FILTER GLASS MANTLES.**

Mandler Diatomaceous Filter Cylinders with metallic headpiece.

2889

No.	Length	Diameter Inside	
1	14 inches	4 inches	3.00
2	11 inches	2½ inches	2.00
3	4 inches	1 inch	1.00
5	2½ inches	⅞ inch	.75
8	2⅝ inches	2½ inches	1.00
9	5¾ inches	2½ inches	1.50

Mandler Diatomaceous Filters

For Bacteriological Work

Every Mandler Diatomaceous Filter cylinder is accompanied by a printed certificate giving the pounds of air pressure it will withstand without passing bubbles after having been immersed in water for twelve hours. Each cylinder is carefully packed in a cylindrical carton for safe transportation.

2889. **FILTER—Mandler Diatomaceous,** cylinder only, with metallic headpiece, with certificate of air-pressure test.

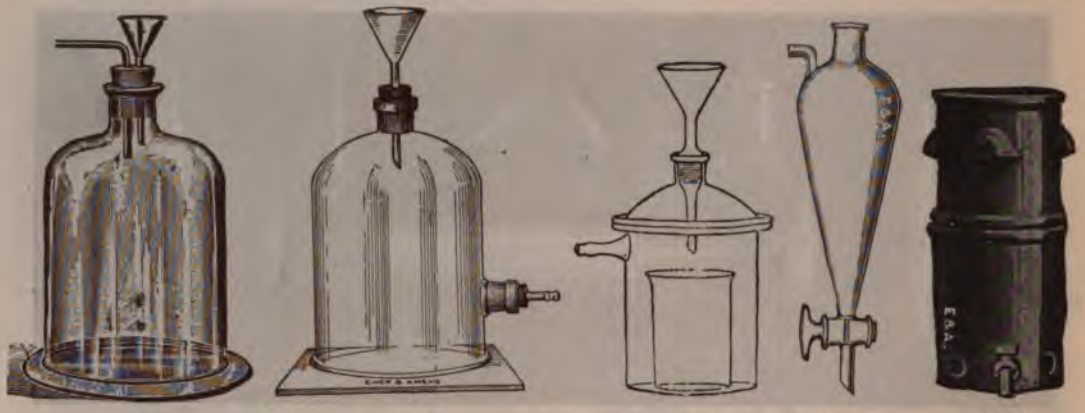
Size, inches	10x2	10x1½	8x1½	8x1	5x1	2½x⅝	1⅜x⅝
Each	5.00	4.00	3.75	3.50	2.50	1.25	1.15

2889/1. **FILTER—Mandler Diatomaceous,** with glass mantle, with circular opening in bottom, but without flask or other container for filtering.

Size of cylinder, in.	10x2	10x1½	8x1½	8x1	5x1	2½x⅝	1⅜x⅝
Each	6.75	5.75	5.00	4.75	3.50	2.00	1.65

2889/2. **FILTER—Glass Mantles** only, **Pyrex** glass, for Mandler Diatomaceous Filters, such as are included with No. 2889/1.

Outside Dimensions, inches	13⅜x4⅜	11x2¾	5⅝x2¾	4¼x1¼	2½x1¼
Diameter of opening, inches	¾	9/16	⅝	⅜	7/16
Each	1.75	1.20	1.00	.75	.50



2890 2892 2894 2895 2896

2890. **FILTERING APPARATUS**—Consisting of a bell jar with rubber stopper, funnel 2½ inches diameter, suction tube, and heavy glass plate.

Size of bell jar, inches	6x8	8x12
Each	**5.00**	**9.00**

2892. **Ditto**—with bell jar tubulated near bottom.

Size of bell jar, inches	6x8	8x12
Each	**6.00**	**10.00**

2894. **FILTERING APPARATUS—Witt,** with ground cover and ground in funnel; jar 6½ inches high, 4⅜ inches inside diameter **10.00**

2895. **FILTER FLASK—Shaw.** Simple and original in its application, can be readily washed free from filtrates and may be permanently mounted on an iron support. The new design has been found very satisfactory to use instead of the side-outlet flask and bell jar with ground glass plate; 500 cc. capacity **5.50**

(For exact description, see Journal of Industrial and Engineering Chemistry, Vol. IX, No. 8, page 793.)

3000

2896. **FILTER—Stoneware,** acid proof. For suction; the upper vessel with perforated bottom ground to fit the lower one. These apparatus are very practical for filtering large quantities under partial vacuum.

Capacity of upper vessel, liters	2	10
Capacity of lower vessel, liters	6	20
Each	**45.00**	**60.00**

3004

2897. **FILTER—White Piano Felt,** i.e. Filtering Bags.

No.	1	2	3	4	5	6	7	8	9	10
Dia. at top; in.	8	9½	11¼	12	13	14	16	18	20½	22½
Depth; in.	8¼	10	12¼	13½	14½	16	17½	20	22½	24½
Capacity; gals.	¼	½	¾	1	1¼	1⅔	2	3	4	5½
Each	**1.05**	**1.50**	**2.00**	**2.65**	**3.30**	**4.00**	**5.25**	**6.35**	**8.25**	**10.50**

3000. **FILTER CASE**—Japanned tin, to hold cut filter paper, 6 sizes from 2½ to 6 inches diameter 5.25

FILTERING APPARATUS—For gases, see Nos. 3646–3648.

FILTER CONES, CYLINDERS, FLASKS, PAPER, PLATES, PRESSES, PUMPS, etc., see under separate headings.

3004. **FINGER COTS**—Heavy rubber .....dozen .75

3006. **Ditto**—Pure thin gum .....dozen .50

3007

3007. **FIRE EXTINGUISHER**—made of heavy drawn brass, seamless tubing, 13½ inches long, 3 inches in diameter; weight 6½ lbs. **10.00**

3007a. **EXTINGUISHER FLUID** only ..... per quart **1.50**
per gallon **6.00**

Flasks

3013

3017

3018

3025

3027

3012. **FLASK—Resistance Glass,** for copper Assay.

Capacity, cc.	150	250
Each	.14	.15

3013. **Ditto—of Pyrex Glass.**

Capacity, cc.	180	250
No. in orig. case	144	108
Each	.25	.30
Original case	32.40	29.16

3017. **FLASK—Resistance Glass,** Assay, with lip.

Capacity, cc.	125	250	500	1000
Each	.13	.17	.25	.42

3018. **FLASK**—Of heavy copper.

Capacity, cc.	250	500	1000	2000
Each	2.50	3.00	3.50	5.20

For other heavy Copper Flasks, see No. 3122.

3025. **FLASK—Erlenmeyer, Resistance Glass.**

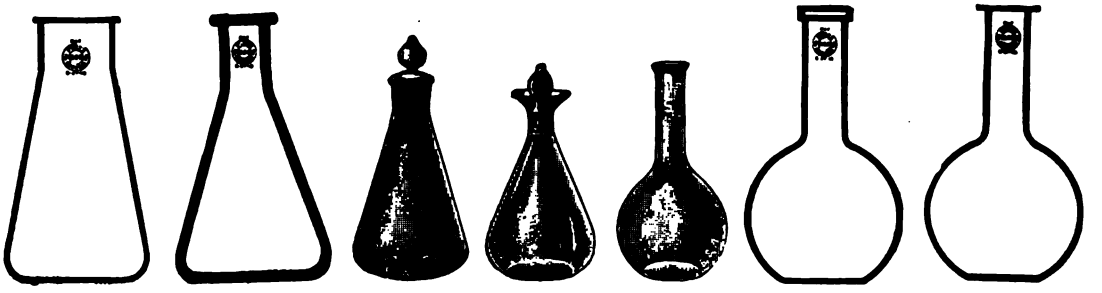
Capacity, cc.	30	60	90	120	150	180	250
Each	.11	.12	.13	.13	.14	.14	.15
Capacity, cc.	300	350	500	700	1000	1400	2000
Each	.17	.19	.21	.29	.34	.42	.50

3025A. **FLASK—Erlenmeyer, Resistance Glass,** with wide mouth.

Capacity, cc.	250	350	600
Each	.15	.19	.25

3027. **FLASK—Erlenmeyer—Pyrex Glass.**

Capacity, cc.	25	50	100	150	200	250	300	500
To take stopper No.	00	1	3	4	5	5	6	6
No. in orig. case	360	276	180	252	144	132	132	72
Each	.16	.16	.18	.18	.20	.22	.25	.29
Original case	51.84	39.74	29.16	40.82	25.92	26.14	29.70	18.79
Capacity, cc.		600	750	1000	1500	2000	3000	4000
To take stopper No.		6	7	8	9	10	10	10
No. in orig. case		60	48	36	24	24	15	12
Each		.31	.34	.42	.51	.60	.79	1.00
Original case		16.74	14.69	13.60	11.01	12.96	10.66	10.80



3027/1 3029 3030 3032 3037 3039 3049

3027/1. **FLASK—Erlenmeyer,** extra wide mouth, **Pyrex glass.**

Capacity, cc.	250	500
To take stopper No.	7	10
No. in orig. case	132	60
Each	.22	.29
Original case	26.14	15.66

3029. **FLASK—Erlenmeyer,** heavy wall, for filtering, **Pyrex glass.**

Capacity, cc.	250	500	1000
To take stopper No.	6	6	7
No. in orig. case	120	72	30
Each	.40	.54	.84
Original case	43.20	35.00	22.68

3030. **FLASK—Erlenmeyer,** Glass stoppered.

Capacity, cc.	125	250	500	1000
Each	.95	1.15	1.40	1.85

3032. **FLASK—Erlenmeyer,** Glass stoppered, with hollow accurately ground glass stoppers, with deep gutter; for iodine determinations, etc.

Capacity, cc.	125	250	500
Each	1.10	1.30	1.70

3037 **FLASK—Boiling,** pear shape, flat bottom. **Resistance glass.**

Capacity, cc.	30	60	90	120	180	250
Each	.11	.12	.13	.13	.14	.15
Capacity, cc.	350	500	700	1000	1400	2000
Each	.19	.21	.29	.34	.42	.50

3039. **FLASK—Flat bottom,** with vial mouth, **Pyrex glass.**

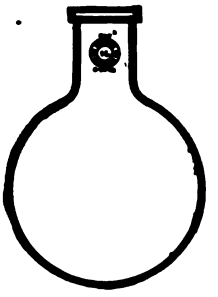
Capacity, cc.	50	100	150	200	300	400	500
To take stopper No.	0	1	1	3	4	4	6
No. in orig. case	192	168	108	144	96	84	72
Each	.17	.18	.20	.22	.25	.27	.30
Original case	29.38	27.22	19.44	28.51	21.60	20.41	19.44
Capacity, cc.	700	1000	1500	2000	3000	6000	12000
To take stopper No.	6	7	7	8	9	10	10
No. in orig. case	36	36	24	18	12	12	6
Each	.36	.43	.51	.60	.76	1.60	3.00
Original case	11.66	13.93	11.01	9.72	8.20	17.28	16.20

3049. **FLASK—Flat bottom,** heavy ring neck, **Pyrex glass.**

Capacity, cc.	500	700	1000	1500	2000	3000	6000	12000
To take stopper No.	5	6	7	7	8	9	10	10
No. in orig. case	72	36	36	24	18	12	12	6
Each	.38	.47	.55	.66	.78	.99	1.75	3.30
Original case	24.62	15.22	17.82	14.26	12.64	10.69	18.90	17.82

3053. **FLASK—Boiling,** pear shape, round bottom. **Resistance glass.**

Capacity, cc.	60	120	180	250	350	500
Each	.12	.13	.14	.15	.19	.21
Capacity, cc.		700	1000	1400	2000	3000
Each		.29	.34	.42	.50	.75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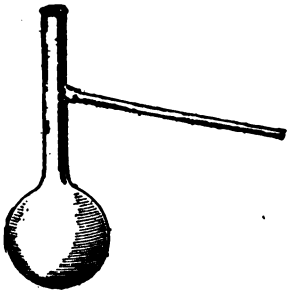
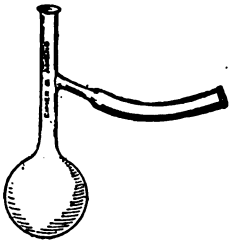

3059

3065A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3055. **FLASK—Boiling,** round bottom, vial neck, **Pyrex glass.**

Capacity, cc.	50	100	150	200	300	400
To take stopper No.	1	2	3	3	4	4
Number in orig. case	156	84	180	144	84	72
Each	.17	.18	.20	.22	.28	.32
Original case	23.87	13.61	32.40	28.51	21.17	20.74
Capacity, cc.	500	700	1000	1500	2000	3000
To take stopper No.	4	6	6	7	9	10
Number in orig. case	48	42	30	24	18	12
Each	.37	.45	.56	.71	.79	1.07
Original case	15.99	17.01	15.12	15.34	12.80	11.56

3057. **FLASK—Round bottom,** short ring neck. **Pyrex glass.**

Capacity, cc	200	500	1000	1500	2000	3000	5000	12000
To take stopper No.	3	6	8	9	10	10	11	11
Number in orig. case	144	72	36	24	18	12	6	6
Each	.28	.38	.55	.66	.78	.99	1.29	3.00
Original case	36.29	24.62	17.82	14.26	12.64	10.69	6.97	16.20

3059. **FLASK—Distilling,** with side tube in center of neck. **Resistance glass.**

Capacity, cc.	30	60	90	125	250	500	1000	2000
Each	.33	.35	.38	.40	.45	.60	.75	1.25

3065. **FLASK—Distilling,** with side tube on middle of neck. **Pyrex glass.**

Capacity, cc.	25	50	100	125	200	250
Number in orig. case	112	54	72	78	84	54
Each	.36	.40	.45	.50	.55	.60
Original case	36.29	19.44	29.16	35.10	41.58	29.16
Capacity, cc.	300	500	1000	1500	2000	3000
Number in orig. case	52	32	24	18	16	9
Each	.65	.70	1.18	1.45	1.60	2.15
Original case	30.42	20.16	25.49	23.49	23.04	17.42

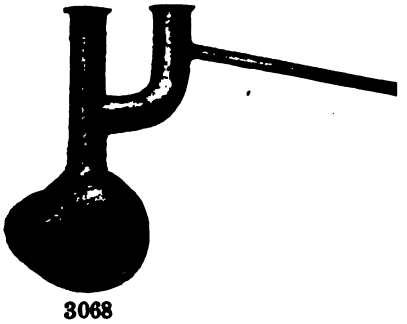
3065A. **FLASK—Distilling, Tuttle,** glass stoppered, as used in water analysis; capacity 1500 cc. **Pyrex glass** **3.00**

3066. **FLASK—Distilling, Anchutz.**

Capacity, cc.	30	60	125	250
Each	.60	.65	.80	.90

3068. **FLASK—Distilling, Claisen, Pyrex glass.**

Capacity, cc.	50	125	250	500	1000	2000
Each	1.20	1.60	1.80	2.20	3.00	4.50

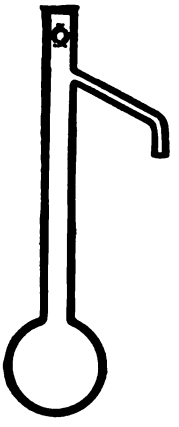

3068

3070. **FLASK—Distilling, Engler,** of standard dimensions for oil distillation. **Pyrex glass.**

Capacity, cc.	100
Number in orig. case	56
Each	.50
Original case	25.20

3071. **FLASK—Distilling, Engler,** used in coal tar industry, made according to standard dimensions. **Pyrex glass.**

Capacity, cc.	200	250
Number in orig. case	62	60
Each	.60	.68
Original case	33.48	36.72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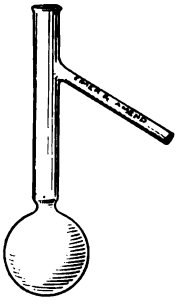
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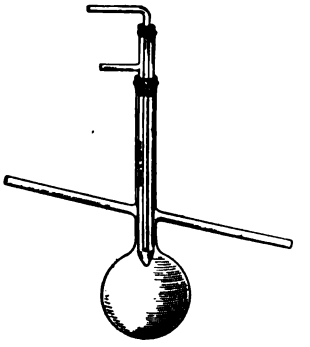
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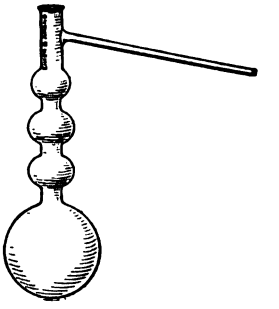

3076

3071/1. **FLASK—Distilling, Hempel,** with bent side tube, **Pyrex glass.**

Capacity, cc.	500
Each	1.50

3072. **FLASK—Distilling, Hempel,** for distillation of Creosote, Bulletin No. 112, Forest Service of U. S. Dept. of Agriculture; capacity 500 cc. **1.30**

3072/1. Ditto—of **Pyrex glass,** cap. 500 cc. **1.75**

3074. **FLASK—Distilling, Kreussler,** with inside condenser.

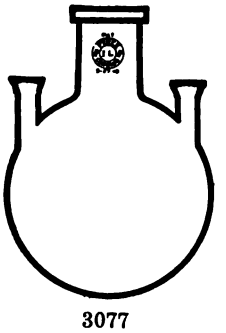
Capacity, cc.	500	1000
Each	1.70	2.20

3076. **FLASK—Distilling, Ladenburg.**

Capacity, cc.	125	250	500	1000
Bulbs in neck	3	3	4	4
Each	.90	1.20	1.75	2.25

3076/1. **FLASK—Distilling, Ladenburg, Pyrex glass.**

Capacity, cc.	125	250	500
Each	1.00	1.40	2.00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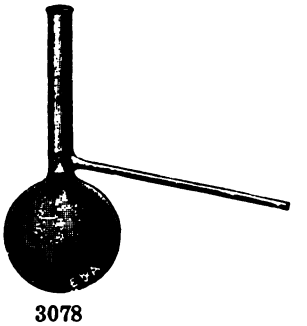

3078

3081

3077. **FLASK—Distilling,** with three necks, **Pyrex glass.**

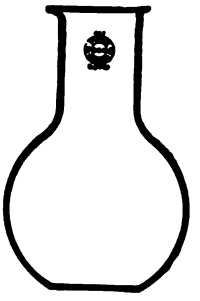
Capacity, cc.	500	1000	2000
Each	2.50	4.00	5.00

3078. **FLASK—Distilling, Lunge,** with trap.

Capacity, cc.	125	250	500	1000
Each	1.20	1.40	1.85	2.35

3081. **FLASK—Extraction,** flat bottom. **Resistance glass.**

Capacity, cc.	60	125	175	250
Each	.11	.13	.17	.21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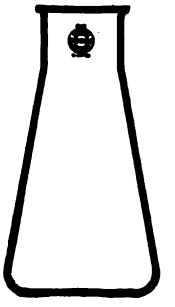

3083/3

3084

3088

3083/1. FLASK—Extraction, flat bottom. **Pyrex glass.**

Capacity, cc.	50	100	150	250	500	750	1000
Number in orig. case	168	120	108	120	60	48	36
Each	.16	.18	.19	.20	.29	.36	.54
Original case	24.19	19.44	18.47	21.60	15.66	15.55	17.50

3083/2. FLASK—Extraction, round bottom. **Pyrex glass.**

Capacity, cc.	100	2000
Number in orig. case	120	18
Each	.18	.69
Original case	19.44	11.18

3083/3. FLASK—Extraction, Pyrex glass, for rubber analysis, Cap. 400 cc. (to take Stopper No. 9) ..... .32
72 pieces in original case 20.75

3084. FLASK—Extraction, Knorr, mercury seal joint; capacity 100 cc. ..... .60

3086. Ditto—With two holes in neck to take care of the return flow of ether ..... .70

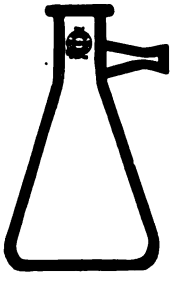
3088. FLASK—Extraction, Sy, with mercury seal joint; large neck facilitates cleaning, and allows of substances being transferred without difficulty; fits the usual size Knorr extractors.

Capacity, cc.	100	150	200	250
Each	1.00	1.20	1.35	1.50

3089. FLASK—Extraction, Sy, Pyrex glass.

Capacity, cc.	100	150	250
Each	2.00	2.25	2.50

3090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3092

3090. FLASK—Filtering, Erlenmeyer shape, with side neck; extra heavy glass.

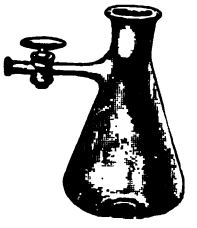
Capacity, cc.	250	500	1000	2000	4000
Each	.50	.70	1.10	2.10	3.30

3091. FLASK—Filtering, heavy wall, with side neck. **Pyrex glass.**

Capacity, cc.	250	500	1000	2000	4000
To take stopper No.	6	6	7	9	9
Number in orig. case	96	60	24	15	6
Each	.70	.96	1.45	2.40	4.00
Original case	60.48	51.30	31.32	32.40	21.60

3092. FLASK—Filtering, pear shape, with side neck; extra heavy glass.

Capacity, cc.	250	500	1000	2000	4000
Each	1.25	1.75	2.30	2.90	4.50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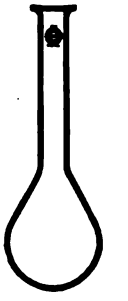
3102

3109

3110

3114/1


3119

3096. FLASK—Filtering, with stopcock on side neck.

Capacity, cc.	250	500	1000	2000
Each	**2.00**	**2.40**	**4.00**	**5.50**

3102. FLASK—Filtering, with ground in funnel, and side tube; extra heavy glass.

Capacity, cc.	200	1000
Each	**3.00**	**4.50**

3107. FLASK—Gas Generating bottle. Resistance glass.

Capacity, cc.	250	500	1000
Each	**.20**	**.26**	**.38**

3109. Ditto—Fitted with rubber stopper, thistle tube and delivery tube.

Capacity, cc.	250	500	1000
Each	**.70**	**.80**	**.90**

3110. Ditto—Generating, with thistle tube and delivery tube ground into the neck.

Capacity, cc.	250	500	1000
Each	**1.65**	**2.20**	**2.80**

3114/1. FLASK—Kjeldahl, with flat bottom and long neck. **Pyrex glass.**

Capacity, cc.	300	500	800
To take stopper No.	5	6	6
Number in orig. case	60	36	36
Each	**.28**	**.37**	**.45**
Original case	**15.12**	**11.99**	**14.58**

3116/1. FLASK—Kjeldahl, round bottom, short neck. **Pyrex glass.**

Capacity, cc.	500
To take stopper No.	6
Number in orig. case	48
Each	**.37**
Original case	**15.99**

3119. FLASK—Kjeldahl, with round bottom and long neck. **Pyrex glass.**

Capacity, cc.	300	500	650	800
To take stopper No.	5	6	6	6
Number in orig. case	60	36	36	36
Each	**.28**	**.37**	**.42**	**.45**
Original case	**15.12**	**11.99**	**13.61**	**14.58**

3121. FLASK—Kjeldahl, round bottom, long neck. **Resistance glass.**

Capacity, cc.	300	500	800
Each	**.25**	**.32**	**.40**

3122

3123

Upright

Reversed

3123/5

3127

3129/1

3124

3125

3122. **FLASK—Kjeldahl, Copper,** heavy, flat bottom; capacity, 1000 cc. **5.25**

3123. **FLASK—Kolle,** culture, with neck indentation. **Pyrex glass.**

Capacity, cc.	320
Number in orig. case	84
Each	.75
Original case	56.70

3123/5. **FLASK—Culture, Earp-Thomas,** patented, with ventilated stopper. May be placed in any position without danger of leakage. Preserves contents of flasks sterile. With this flask media may be stored in the laboratory for years. For further particulars, write for Bulletin 271.

Capacity, cc.	50	100
Each	.70	.80

3124. **FLASK—Moisture, Brown Duvel,** for determining moisture in grain, as used by the Bureau of Grain Industry, U. S. Dept. of Agriculture. **Pyrex glass.**

Capacity, cc.	1000
Number in orig. case	40
Each	1.50
Original case	54.00

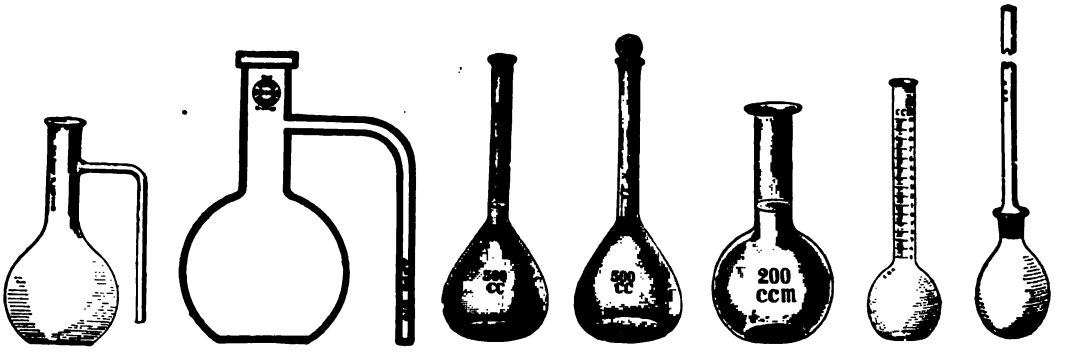
3125. **Ditto—of copper, double wall** **9.60**

3127. **FLASK—Soil,** of **Pyrex glass,** with ground in condenser tube 100 cm. long.

Capacity, cc.	200	500
Each	1.60	2.40

3129/1. **FLASK—Sulfur, Johnson,** heavy ring neck; extensively used in iron and steel analysis. **Pyrex glass.**

Capacity, cc.	275
To take stopper No.	6
Number in orig. case	108
Each	.32
Original case	31.10



3130 3131 3132 3134 3138 3164 3166

3130. **FLASK—Sulfur,** flat bottom, with side neck, vial neck finish.

Capacity, cc.	125	250	500	1000
Each	.35	.40	.50	.75

3131. **FLASK—Sulfur,** heavy ring neck, flat bottom, side neck. **Pyrex glass.**

Capacity, cc.	500
Number in orig. case	40
Each	.75
Original case	27.00

3132. **FLASK—Volumetric,** not stoppered, accurately graduated.

Capacity, cc.	10	20	25	50	100	200
Each	.35	.36	.37	.45	.60	.62
Capacity, cc.		250	300	500	1000	2000
Each		.70	.75	1.00	1.35	2.00

3134. **FLASK—Volumetric,** glass stoppered, accurately graduated.

Capacity, cc.	10	20	25	50	100	200
Each	.70	.75	.80	.85	1.05	1.10
Capacity, cc.		250	300	500	1000	2000
Each		1.20	1.25	1.35	1.60	2.35

3138. **FLASK—Volumetric,** capacity 200 cc., wide neck; for insoluble phosphoric acid determinations ..... .60

3139. **Ditto—of Pyrex glass** ..... .90
108 pieces in original case 87.48

3140. **FLASK—Volumetric,** capacity 250 cc., short neck, with mark low down; stouter glass than regular volumetric flasks. Preferred by many fertilizer chemists to the ordinary graduated flasks ..... each .80
per dozen 9.00

3142. **FLASK—Volumetric,** graduated to deliver 58.3 cc.; used for determination of the causticity and alkalinity in boiler feed water ..... .60

3148. **FLASK—Volumetric, Standard,** see next page.

3150. **Ditto—Glass stoppered,** see next page.

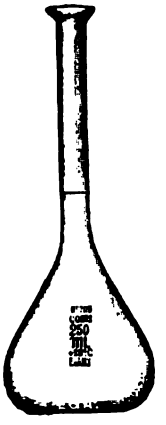
3156. **FLASK—Volumetric,** unstoppered, **without** varnish mark.

For varnish marks at, cc.	50	100	250	500	1000
Each	.40	.55	.60	.90	1.20

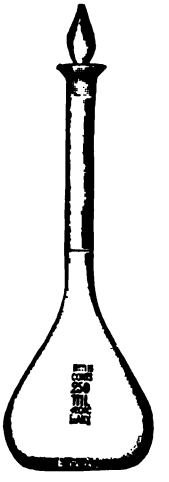
3158. **Ditto—glass stoppered** ..... .80 1.00 1.10 1.25 1.45

3164. **FLASK—Volumetric, with graduated neck.** Capacity up to the bottom of the neck, 95 cc.; next 5 cc., graduated on neck from 5 cc. to 0 cc. in 1/5th, rest of neck graduated 0–10 cc. in 1/5th cc. 1.10

3166. **FLASK—Acetylization,** for determining menthol in oil of peppermint; with ground in condensing tube 1.65



3148



3150

Flasks, Standard, Precision

3148. FLASK—S. S. Standard, unstoppered.

In the manufacture of S. S. standard flasks our factory follows the instructions and specifications as laid down by the Bureau of Standards as closely and painstakingly as possible. The most modern appliances, machines and methods of calibrating, approved by the Bureau of Standards, are employed. We cannot, however, guarantee that every piece will receive a Bureau of Standards' certificate, since the requirements of certification are so exceptionally stringent.

Capacity, ml.	50	100	200	250	500	1000	2000
Each	**1.00**	**1.25**	**1.40**	**1.50**	**1.85**	**2.75**	**3.25**

3148/1. FLASK—S. R. Standard, unstoppered.

These flasks are drawn from our stock of S. S. standard flasks. They have been sent to the Bureau of Standards and have received a **report.**

Capacity, ml.	50	100	200	250	500	1000	2000
Each	**1.65**	**2.10**	**2.30**	**2.75**	**3.20**	**4.40**	**4.85**

3148/2. FLASK—S. C. Standard, unstoppered.

These flasks are drawn from our stock of S. S. standard flasks. They have been sent to the Bureau of Standards and have received a **certificate.**

Capacity, ml.	50	100	200	250	500	1000	2000
Each	**1.75**	**2.25**	**2.50**	**3.00**	**3.50**	**4.75**	**5.25**

3150. FLASK—S. S. Standard, stoppered. (Same specifications as No. 3148.)

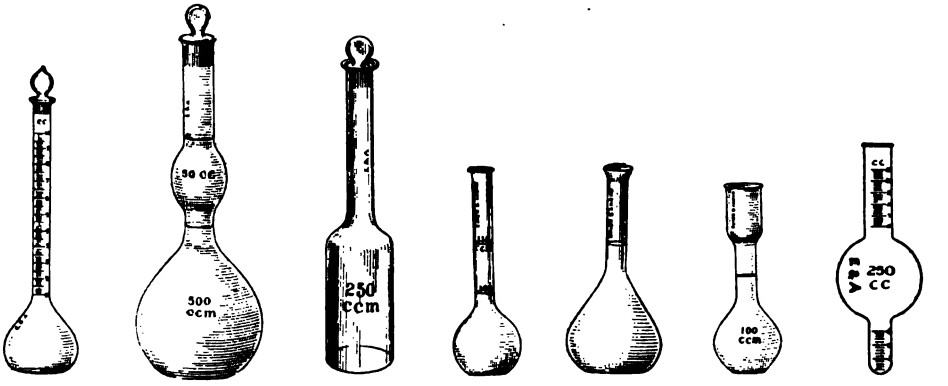
Capacity, ml.	50	100	200	250	500	1000	2000
Each	**1.35**	**1.75**	**2.00**	**2.25**	**2.75**	**3.75**	**4.50**

3150/1. FLASK—S. R. Standard, stoppered. (Same specifications as No. 3148/1.)

Capacity, ml.	50	100	200	250	500	1000	2000
Each	**2.10**	**2.50**	**2.75**	**3.10**	**3.90**	**5.35**	**6.00**

3150/2. FLASK—S. C. Standard, stoppered. (Same specifications as No. 3148/2.)

Capacity, ml.	50	100	200	250	500	1000	2000
Each	**2.25**	**2.75**	**3.00**	**3.50**	**4.25**	**5.75**	**6.50**



3168 3170 3174 3176 3180 3182 3182/1

3168. **FLASK—Cassia,** for assaying Cinnamic Aldehyde; total capacity, 110 cc., neck graduated 10 cc. in 1/10th subdivisions; glass stoppered **1.90**

3170. **FLASK—Giles.** Used for making normal solutions; by taking one-tenth more of the reagent than would be used for making one liter of normal solution, and then filling up to the 1100 cc. mark, there is obtained 100 cc. of solution for ascertaining exact titer, leaving exactly one liter for correction.

Graduated at, cc.	500 & 550	1000 & 1100	2000 & 2200
Each	**2.60**	**3.60**	**5.25**

3172. **FLASK—Shaking,** unstoppered; accurately graduated; heavy glass.

Graduated to, cc.	250	500	1000
Each	**1.00**	**1.20**	**1.50**

3174. **Ditto**—Glass stoppered, each **1.50** **1.70** **2.00**

3176. **FLASK—Sugar,** accurately graduated with two marks on the neck

Graduated at, cc.	50 & 55	100 & 110	200 & 220
Each	**.45**	**.55**	**.85**

3178. **FLASK—Sugar, ungraduated,** and without varnish mark.

For varnish marks at, cc.	50 & 55	100 & 110	200 & 220
Each	**.40**	**.50**	**.75**

3180. **FLASK—Sugar, Bates,** pear shape, funnel top; accurately graduated at 100 cc. according to the requirements of the Bureau of Standards. **Pyrex glass** ..... **.80**

Original case (84 pieces in case) **60.48**

3182. **FLASK—Sugar, Kohlrausch,** with enlarged mouth; accurately graduated.

Graduated at, cc.	100	200	200.6	201.2	201.4
Each	**.60**	**1.00**	**1.00**	**1.00**	**1.00**

3182/1. **FLASK—Volumetric, Foots,** graduated, for determining fatty acid in cottonseed by saponification. Capacity of bulb 250 cc. **2.50**

FLASK HEATERS and HOLDERS—see Heaters.

3183

3183/3

3183. **FLOTATION MACHINE—Braun K. & K.,** for laboratory tests, constructed of heavy cast iron, interior consisting of a hollow cylinder coated with a special hard baked enamel; a wooden drum provided with a series of longitudinal air slots; and a larger number of longitudinal riffles running the entire length of the drum. An iron strip perforated with small holes placed tangentially to the periphery of the drum admits the pulp into the frothing box. Capacity from one to two pounds of dry product; shipping weight 185 lbs.; dimensions 27x21x12 inches, with tight and loose pulleys 6x2 inches; speed recommended 400 r. p. m. Complete with directions for use. Descriptive bulletin sent on request. Price without motor **108.00**

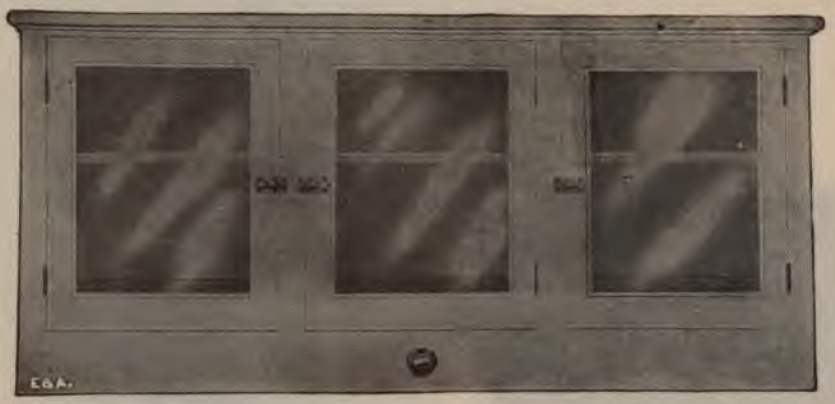
3183/1. **Feeder for Oils—Braun Mechanical Disk,** for use with No. 3183 ..... **55.00**

3183/2. **Feeder for Acids—Braun Mechanical Disk,** for use with No. 3183 ..... **82.00**

3183/3. **FLOTATION MACHINE—D. F. C.** Consists of a single aluminum casting compressing the agitation cell, and a chamber from which the froth is collected. The agitation cell contains a steel shaft and an impeller. The impeller has 4 blades set at angles of 90°. The steel shaft is coated with lead and the impeller blades are made of aluminum to resist the corrosive action of acids. The motor employed is ⅛ H. P. (reversible variable speed type) which will give any speed from 400 to 1800 r. p. m. Power may be obtained from regular lamp socket. Apparatus is mounted on a heavy board which carries a bronze bearing bracket fitted with grease cups, for the support of the impeller shaft, as well as a shelf for the motor: thus mounted the equipment is 4 ft. high, and may be attached to the wall convenient to water supply. A small metal hoe or froth remover is supplied with the apparatus. Weight packed for shipment—150 lbs. Price without motor **100.00**

3183/4. **Ditto**—with motor **150.00**

Descriptive bulletin on request



3185/1

3185

3185/2

3185/4

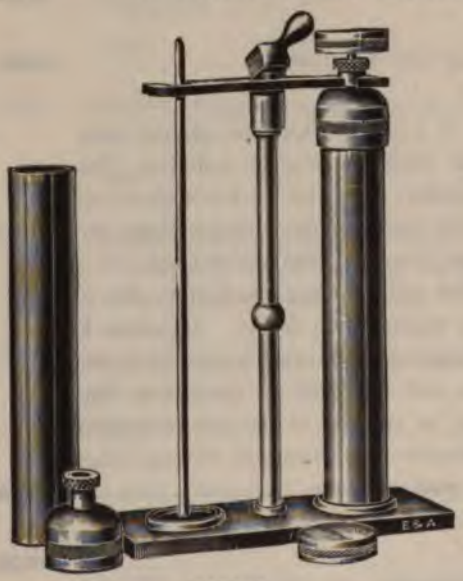
3185/3

Flour Testing Apparatus

3185. **BAKING CYLINDER**—with graduated indicator and detachable cup for definite capacity. Two are recommended for comparative tests **8.75**

3185/1. **CABINET—electric proofing,** for dough raising. Made of dried lumber, with glass doors, removable slat shelves, asbestos lined heater chamber and equipped with electric heaters.

Size, inches	28x48x14	28x72x14
Each	**76.00**	**116.00**



3185/6

3185/2. **DOUGH CUP**—white earthenware used in gluten washing and for determining the absorption of flour ..... **.50**

3185/3. **DOUGH TESTER—Jago,** for determining the viscosity or stickiness of dough as described in Jago's text book **125.00**

3185/4. **FLOUR SLICK**—of spring steel, nickel-plated, size 6x2½" or 6x3½"...each **1.25**
When ordering state size.

3185/5. **FLOUR STICK**—of brass, used for mixing dough to prevent the discoloration or absorption from flour **4.00**

3185/6. **GLUTEN TESTER—Foster,** used in Universities and Industrial Laboratories, also in large Bakeries for measuring the degree of expansion of wet glutens and doughs. It gives a definite comparison of the raising power of various flours. Descriptive Bulletin No. 250 on request **35.00**

Working position

Tilting position

3185/7

3185/7. **KNEADING AND MIXING MACHINE**—especially used in Universities, Agricultural Colleges, Experimental Stations, State Grain Inspection Departments, Mining College Laboratories, etc. Hand or power driven.

No.	Trough				Space Required			Drive				Weight Lbs.		Price
	Working Capacity		Total Capacity											
	Gals.	Cu. Ft.	Gals.	Cu. Ft.	Length	Width	Height	Diam. of Pulley	Width of Belt	Rev. per Minute	H. P. of Pulley	Net	Gross Domestic	
3	.22	.03	.45	.06	1′ 2″	1′ 5″	1′ 1″	8″	1 ″	90	¼	36	40	**215.00**
4	.66	.09	1.12	.15	1′ 6″	1′ 10″	1′ 6″	9″	1½″	110	⅓	83	89	**275.00**
6	2.25	.30	3.00	.40	1′ 11″	2′ 7″	1′ 8″	12″	2 ″	130	½	145	157	**400.00**

The mixing trough is of cast iron and made in two parts (split through the blade axis). All working parts are therefore perfectly accessible and easy to clean. The trough is fitted into a tilting frame, allowing an easy discharge of the mixed material.

The two mixing blades are usually of iron or steel, but for special purposes the trough and mixing blades can be made of solid bronze or other suitable material.

When a pulping or shredding action is desired, teeth can be cut into the edges of the mixing blades.

Where heating or cooling during the mixing operation is required, machines can be equipped with a jacket covering the lower part of the trough. Covers of any description can be furnished.

For additional apparatus for Flour Testing and for Chemicals, see our various Catalogs and Bulletins. Particular attention, however, is directed to the following:

Balance, Analytical, see Nos. 212, 215, 216, 220.

Balance, Porcelain Plate, see No. 332.

Balance, Baker's, see Nos. 356 to 360.

Balance, Weights, see No. 470, also No. 516.

Burette, see No. 1304, 25 cc.

Carbonic Acid Apparatus, see **Carbon Dioxide Apparatus.**

Tintometer, see **Colorimeters.**

Jars, Expansion, see No. 4132.

Mill, see **Mills and Crushers.**

Moisture Tester, for grain, see No. 4570 to No. 4604.

For **Special Baking Ovens, Freas** automatically controlled electrically heated **Baking Ovens, Freas Regular** moisture and **Vacuum Ovens** for flour testing, see **Ovens.**

Pipette, see No. 5232, 10 cc.

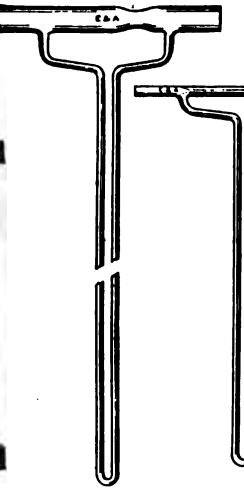
Protein Determination Apparatus, see **Nitrogen Determination Apparatus.**

Water Stills, see **Distilling Apparatus.**

Extraction Apparatus, Furnaces, Magnifiers & Microscopes, Sieves, and Thermometers, see appropriate headings.

3187

3187/4



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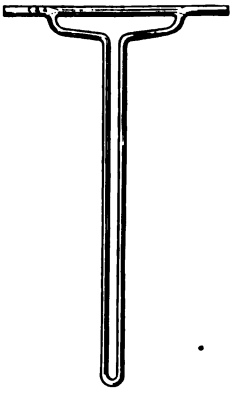

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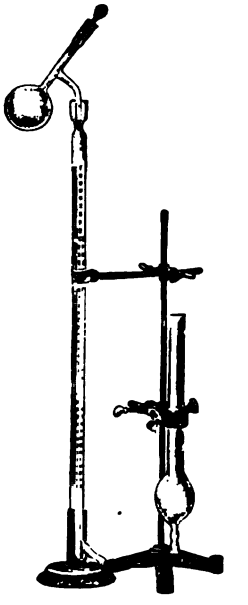


3187/11

3187. **FLOW METER—Indicating, Recording** and **Integrating Type F-4** **455.00**

An instrument for accurately measuring the **total flow** of steam, water, air, gas, oil, etc., through pipes of any diameter. The same meter can be used to measure any of the above by use of curve supplied with each meter and so furnish valuable information in the economical management of any manufacturing industry or Central Station.

When meter is permanently installed no curves are necessary, the meter giving direct reading in pounds per hour, gallons per minute, or cubic feet per minute, etc., on a white scale 17" in diameter with heavy flow lines and figures ⅞" in height, which enables the operator to read the meter as easily as a clock.

It is of strong and simple construction, is designed for installation in boiler rooms and places of a similar nature and will operate on any pressure up to 300 lbs. gauge.

3187/1. Type F Recording only **360.00**

3187/2. Type F–2 Recording and Intergrating **430.00**

3187/3. Type F–3 Indicating and Recording **385.00**

3187/4. **FLOW METER—Portable Indicating, Testing Meter, Type T,** high and low velocity. (Meter with carrying case weighs 29 lbs.) **145.00**

To measure the **rate of flow** of steam, water, air, gas, oil, etc., in any diameter pipe and under any temperature or pressure usually found in commercial practice.

The meter consists of U-Tube with glass legs half filled with mercury. The mercury deflection due to the flow is read on a scale graduated in tenths of inches, located between the glass tubes. This deflection is applied to a curve furnished with the meter, and the flow causing the deflection obtained.

For low velocity tests, oil is used instead of mercury.

3187/5. **FLOW METER—(Venturimeter) glass,** for indicating slow velocity of gases ..... **3.[illegible]**

3187/6. **FLOW METER—(Venturimeter) glass,** for indicating high velocity of gases ..... **4.[illegible]**

Special designs made according to sketches.

3187/10. **FLUORMETER—Oettel,** for the volumetric determination of fluorine; glass parts with wooden base ..... **9.[illegible]**

3187/11. **Ditto**—complete with iron support ..... **10.[illegible]**

Forceps

3188

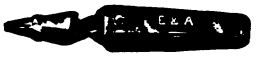
3190

3191

3188. **FORCEPS—Brass,** ends bent, best finish ..... .25

3190. **FORCEPS—Brass, with ivory tips,** ends bent 1.60

3191. **Ditto—with curved ivory tips,** for small fractional weights 1.60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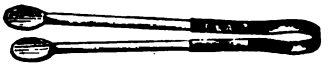
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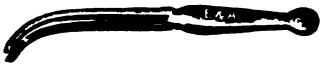

3196

3192. **FORCEPS—Cornet,** the best for handling microscopic cover glasses ..... .40

3194. **FORCEPS—Glass,** with brass spring; length 6 inches 1.75

3196. **FORCEPS—Gooseneck,** brass, nickel plated; length 6 inches ..... .75

3200

3202

3204

3200. **FORCEPS—Steel,** for holding lead buttons, etc.

Length, inches	4	5	6
Each	.15	.17	.20

3202. **FORCEPS—Steel,** polished, with fine points; length 4½ inches ..... .12

3204. **FORCEPS—Steel,** nickel plated, with fine points; length 4¼ inches ..... .35

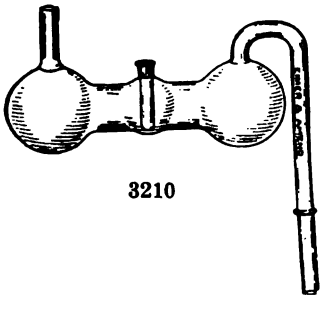
3206

3208

3206. **FORCEPS—Steel, French form,** nickel plated, length 5½ inches, forceps both ends, one end with heavy platinum tips 13.00

3208. **FORCEPS—Steel, Plattner,** with heavy platinum tips 13.00

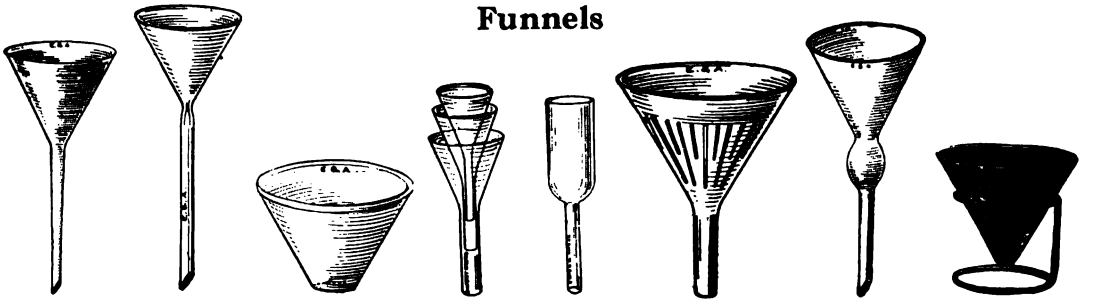
For other forceps—see Bacteriological Catalog, Section I.


3210

3210. **FREEZING APPARATUS**—Glass, Carre's principle; small size 4.00

3212. **Ditto**—Large size 5.00

Funnels



3214 3220 3224 3226 3228 3232 3234 3238

3214. **FUNNEL—Glass,** angle of approximately 60°, stem ground to a point.

Diameter, cm.	2.5	4	5	6.5	7.5	9	10	11
Each	.29	.30	.31	.32	.36	.38	.45	.50
Per doz.	3.00	3.10	3.20	3.40	4.00	4.20	5.00	5.40
Diameter, cm.		12.5	15	18	20	23	25	30
Each		.55	.62	.80	1.00	1.10	1.50	2.35
Per doz.		6.00	6.80	8.40	11.00	12.00	16.50	25.00

3216. **FUNNEL—Glass, Bunsen,** with **ground rim,** angle of approximately 60°; thin stem about 4 inches long, ground to a point.

Diameter, cm.	2.5	4	5	6.5	7.5	9	10	11	12.5	15
Each	.30	.32	.33	.35	.40	.45	.50	.60	.75	.95

3218. **FUNNEL—Glass, Bunsen,** as above, with extra long stems about 6 inches long.

Diameter, cm.	5	6.5	7.5	9	10
Each	.38	.42	.48	.50	.55

3220. **FUNNEL—Glass, Bunsen,** with constriction in top of stem facilitating rapid filtration; angle of approximately 60°, stems about 4 inches long, ground to a point.

Diameter, cm.	5	6.5	7.5	10
Each	.50	.55	.60	.65

3224. **FUNNEL—Glass, without stem,** for sugar analysis.

Diameter, cm.	7.5	9	10
Each	.36	.38	.42

3226. **FUNNEL—Glass, small,** set of 3, diameter ⅞, 1, and 1⅛ inch, for filling burettes, etc. ..... **set**

3228. **FUNNEL—Glass, "Carbon Filter,"** for use with Gooch crucibles, etc.

Diameter at top, mm.	20	25	28	32	35	38
Each	.15	.20	.25	.30	.35	.40

3232. **FUNNEL—Glass, ribbed,** for quick filtering.

Diameter, inches	3½	3¾	4¾	5¾	7¼	8¾	10¼	13
Each	.20	.22	.25	.35	.60	.90	1.35	2.50

3233. **FUNNEL—Glass, ribbed,** without stem, for sugar analysis.

Diameter, inches	2¾	3¾	4¾	5¾
Each	.30	.35	.40	.55

3234. **FUNNEL—Glass, with bulb on stem,** for filtering with glass wool, etc.

Diameter, inches	4½	5½	7
Each	.95	1.20	1.30

3238. **FUNNEL—Alundum** conical filter, for rapid filtration by suction. The cone is held in place by stretching a piece of Gooch Tubing over the top of the funnel before introducing the cone. Advantageous on account of large filtering area; can be thoroughly and completely washed from all soluble salts as the entire filtering surface is within the funnel. Filter paper can be used in the filter, if desired. Light aluminum stand can be supplied with the outfit, but is not included in the price.

Diameter, inches	1¾	2½	3	4½
Height, inches	1 5/16	1⅞	2 7/16	3½
Capacity, cc.	20	50	60	100
Each	.35	.69	.98	1.73

These cones can be furnished in three mixtures: R. A. 320 dense, R. A. 321 medium, and R. A. 322 coarse.

3240

3244

3248

3250

3240. **FUNNEL—Glass, Spencer** (Journal I. & Eng. Chem., Vol. 4, No. 8, Sept., 1912), with rubber ring, for filtration by suction, using an Alundum filtering crucible. The air pressure causes the rubber ring to bear upon the edges of the crucible and against the wall of the funnel, making tight joints. The supporting points in the funnel leave all parts of the crucible accessible for thorough washing **1.10**

3240a. Rubber rings only ..... **.15**

3244. **FUNNEL—Agate Ware.**

Capacity, quarts	¼	½	1	2	4
Each	.55	.60	.70	.90	1.10

3246. **FUNNEL—Copper.**

Capacity, pints	¼	½	1	2	gal.	½	1
Each	1.10	1.70	2.20	3.00		4.50	6.00

3248. **FUNNEL—Porcelain,** with handle.

Diameter, cm.	8.6	12	17½
Each	.30	.60	1.70

3250. **FUNNEL—Porcelain,** with small perforations, and handle.

Diameter, cm.	11	13	16	21	26
Each	.70	.90	1.50	1.80	3.25

3254

3255

3257

3260

3254. **FUNNEL—Porcelain, Buchner,** with stationary perforated disc.

Diameter, cm.	5	7.5	10	12.5	15	20	25
Each	.75	1.25	1.75	2.20	3.00	5.50	8.50

3255. **FUNNEL—Buchner,** of acid proof stoneware.

Diameter, cm.	16	26
Each	4.00	7.00

3257. **FUNNEL—Hirsch, best American Porcelain,** Coors make, with stationary perforated disc.

Diameter, cm.	5	7.5	9.2	10.3
Each	.72	.90	1.08	1.44

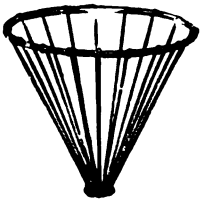
3258. **FUNNEL—Hard Rubber.**

Capacity, ozs.	6	8	16	24
Diameter, inches	3	4	4¾	5⅞
Each	.45	.60	.75	1.00

3260. **FUNNEL—Stoneware** acid proof.

Diameter, inches	4	6	8	10	12	16
Each	1.20	1.40	1.90	3.00	4.00	7.70

FUNNEL—Stoneware, with stopcock, see **Separatory Funnel,** No. 3314.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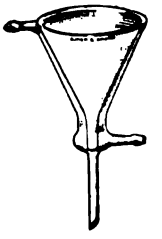
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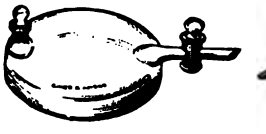

3282

3262. **FUNNEL—Tin Plate.**

Capacity, pints	¼	½	1	2	gal.	½	1
Each	.10	.12	.15	.20		.30	.45

3264. **FUNNEL—Filter Rack,** to hold filter paper away from sides of the funnel; made of galvanized iron wire and rubber ring.

Diameter, cm.	12.5	18.5	23	30
Each	.45	.60	.75	1.00

3266. **FUNNEL—Hot Water or Steam, plain glass,** double jacketted; especially useful for the filtrations of hot solutions which easily crystallize, or which are liable to catch fire; diameter, 10 cm. **6.00**

3268. **Ditto—Exhausted and silvered,** diameter 11 cm. **10.00**

3270. **FUNNEL—Cover only** for above, silvered and exhausted ..... **extra 4.00**

3272. **FUNNEL—Hot Water, Plantamour,** of tin plate, double walls; inside diameter 5½ inches **3.50**

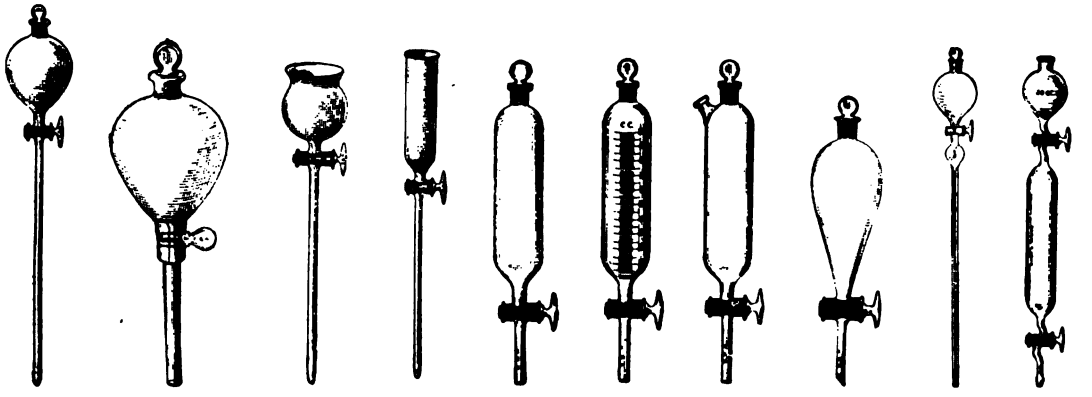
3274. **FUNNEL—Steam, Plantamour,** as above; with steam coil **4.50**

3276. **FUNNEL—Hot Water,** heated by steam or hot water from a distance, with lead coil; inside diameter 5 inches **3.15**

3278. **FUNNEL—Hot Water, Koch,** of heavy copper, double walls, on removable iron legs; inside diameter 5½ inches; without glass funnel **7.50**

3280. **FUNNEL—Hot Air, Lothar Meyer,** of copper, with support and ring burner; inside diameter 5½ inches; without glass funnel **20.00**

3282. **FUNNEL—Separatory.** So called **"Terrapin Separator,"** used with good results by the Bureau of Chemistry, U. S. Dept. of Agriculture, in working with immiscible liquids having a tendency to form emulsions that separate with difficulty. Capacity about 200 cc. **7.50**



3286 3288 3290 3292 3294 3296 3298 3300 3302 3304

3286. FUNNEL—Separatory, globe shape, glass stoppered, long stem.

Capacity, cc.	30	60	125	175	250	500	1000	2000
Each	**1.35**	**1.40**	**1.65**	**1.90**	**2.10**	**2.70**	**3.50**	**6.85**

3288. FUNNEL—Globe shape, heavy glass, glass stoppered.

Capacity, cc.	250	500	1000	2000	4000
Each	**2.50**	**3.00**	**4.50**	**6.00**	**7.50**

3290. FUNNEL—Thistle top, glass stoppered, long stem.

Capacity, cc.	30	60	125	250
Each	**1.40**	**1.50**	**1.90**	**2.60**

3292. FUNNEL—Cylindrical, open top, glass stoppered, long stem.

Capacity, cc.	30	60	125	250
Each	**1.40**	**1.50**	**1.90**	**2.60**

3294. FUNNEL—Cylindrical, glass stoppered; sizes to 250 cc. with long stems, larger sizes with short stems.

Capacity, cc.	30	60	125	250	300	600	1000	1250
Each	**1.35**	**1.60**	**2.45**	**3.00**	**3.25**	**3.85**	**6.25**	**7.00**

3296. Ditto—Graduated, in cubic centimeters.

Capacity, cc.	125	250	500	1000
Each	**2.75**	**4.00**	**4.75**	**7.75**

3298. FUNNEL—Same as No. 3294, **with side neck.**

Capacity, cc.	300	600	1000
Each	**3.20**	**4.00**	**6.50**

3300. FUNNEL—Squibb, pear shape, with glass stopper.

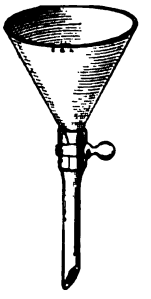
Capacity, cc.	125	250	500	1000
Each	**2.00**	**2.25**	**3.25**	**5.50**

3302. FUNNEL—Walter, modified by Freas, for delivering single drops. The stem is of small bore heavy walled tubing, which prevents gases bubbling backwards through the funnel; capacity, 60 cc. **2.25**

3304. FUNNEL—Carnot, for nickel determinations as described in Blair-Chemical Analysis of Iron, p. 191, 6th Ed.; capacity of body 200 cc., bulb 100 cc., graduated at the 30 cc. mark **4.50**

3305. FUNNEL—C. M. Johnson, globe shape, long stem, open top, extensively used in steel laboratories and adapted for routine work **2.00**

3306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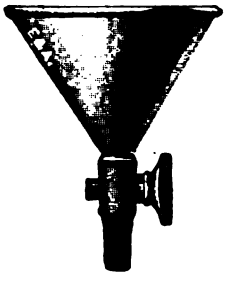
3312


3314

3306. **FUNNEL—For sulfonation test of Creosote,** see Forest Service Bulletin No. 112 of the U. S. Dept. of Agriculture; neck graduated 0–5 cc. in 1/10th **3.50**

3308. **FUNNEL—Conical shape, glass stoppered.**

Capacity, cc.	125	250	500	1000	2000	4000
Diameter, cm.	7.5	10	12.5	15	20	25
Each	**2.00**	**2.40**	**3.40**	**4.80**	**6.00**	**8.50**

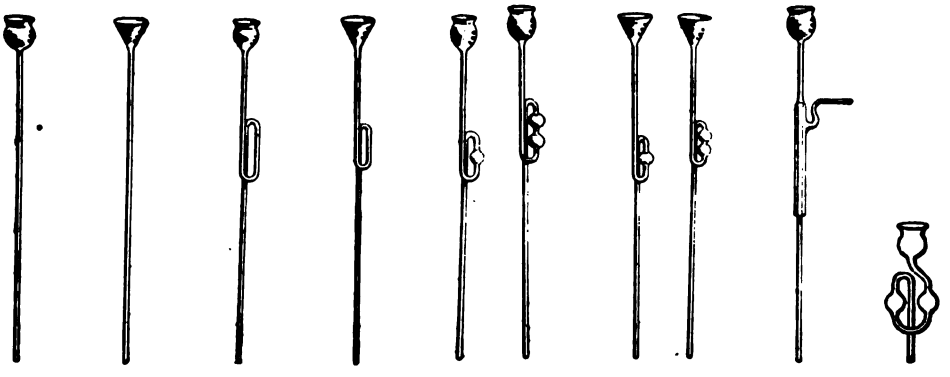
3312. **FUNNEL—With ground rod stopper,** for quickly separating liquids.

Capacity, cc.	500	1000	2000	4000	8000
Each	**1.75**	**2.25**	**2.75**	**3.75**	**6.25**

3314. **FUNNEL—Stoneware,** acid proof, conical shape.

Diameter, cm.	23	30
Each	**7.20**	**9.50**

3315. **FUNNEL—Sulfur,** heavy glass, angle 60°; 2½" diam. on top, capillary stem 12" long **.50**


3316 3318 3320 3322 3324 3326 3328 3330

3316. **FUNNEL—Tube,** thistle top, straight.

Length, cm.	30	40	45	50
Each	**.15**	**.16**	**.18**	**.20**

3318. **Ditto—Conical top.**

Length, cm.	30	40	45	50
Each	**.16**	**.18**	**.20**	**.25**

3320. **FUNNEL—Safety,** thistle top, with bend ..... **.30**

3322. **FUNNEL—Safety,** conical top, with bend **35**

3324. **FUNNEL—Safety,** with bulbs, thistle top.

With bulbs	1	2	3
Each	**.35**	**.40**	**.45**

3326. **Ditto—Conical top, each** ..... **.40** **.45** **.50**

3328. **FUNNEL—Vogel,** funnel and delivery tube combined ..... **.80**

3330. **FUNNEL—Generator,** short stem with 2 bulbs, for gas generators; small ..... **.60**

Ditto—large size ..... **.90**

Funnel Supports, see **Supports.**

FURNACES

3331

Replaceable Unit

Electric Organic Combustion Furnace

This excellent apparatus was designed to replace the gas heated furnaces, but more especially as a radical improvement of Electric Organic Furnaces of the non-opening types.

Special attention is directed to the fact that the furnaces are quickly responsive to all conditions of Quick or Slow Heating or Cooling, combined with absolute temperature control and easy accessibility of observation during an operation.

The outfit has met with instantaneous approval by many of the leading organic chemists of this country, who have adopted the apparatus as their standard equipment.

In general practice, the use of the Multiple Unit Organic Combustion Furnace is not unlike the gas burner type. Each section of the electric furnace, during any one operation of combustion, is used independently in place of groups of Bunsen burners. Each section is easily moved along the rails to provide for combustion at different points, instead of the use of additional burners of the gas type. The individual switches and rheostats mounted on the base afford a means of operating each furnace independently.

For observation purposes during the operation, and without shutting off the heat, the upper half may be raised, exposing the glass combustion tube. During such examination less heat is lost than in the gas furnace, because in the latter type, cold air currents are always present.

As no fumes are present with the electric furnace, and because of the effective heat insulation and definite temperature control, the strong advantages of the Multiple Unit Organic Furnace are at once apparent.

Replaceable Units—Characteristic of all Multiple Unit Appliances the units are replaceable by the operator. This advantage of enabling the operator to have on hand an extra or spare unit for emergency service is readily apparent.

Temperature Control—Each furnace when used on full rated voltages reaches 1,200°F. (650°C.) in fifteen minutes or 1,832°F. (1,000°C.) in forty minutes. Lower temperatures may be held indefinitely, or same temperatures attained slowly by sliding the rheostat into circuit.

Rapid Cooling—Shutting off the current and opening the upper half for rapid cooling, cools each furnace to 900°F. (482°C.) in five minutes and to 600°F. (315°C.) in ten minutes.

3331. **FURNACE—Electric Combustion Multiple Replaceable Unit Type,** comprising 3 furnaces—4, 8 and 12 inches long, respectively, inside diameter 1¼ inches, heads bored 1 3/16 inches diameter, each with rheostat; mounted as illustrated, with nickel trough for combustion tube support; total length 36 inches **175.00**

Extra Units:

		Complete units	Refractory only	Coiled Wire only
Type 1– 4″ for 110 or 220 volts	each	4.25	2.00	2.25
" 2– 8″ " " " " "	each	5.50	2.50	3.00
" 3–12″ " " " " "	each	6.25	3.00	3.25

Two units are required for each of the above three sizes of furnaces.

Be sure to specify voltage when ordering.

COMBUSTION FURNACE—MULTIPLE UNIT—Continued.

3331/2. **FURNACE—Electric Combustion Multiple Replaceable Unit Type,** small, for **Dennstedt** method, with three furnaces, 3, 6 and 8 inches long, respectively, otherwise identical with No. 3331; total length 30 inches **175.00**

Extra Units:

		Complete units	Refractory only	Coiled Wire only
Type 1S — 3″ for 110 or 220 volts	each	4.50	2.00	2.50
Type 2S — 6″ for 110 or 220 volts	each	5.75	2.50	3.25
Type 3S — 8″ for 110 or 220 volts	each	6.50	3.00	3.50

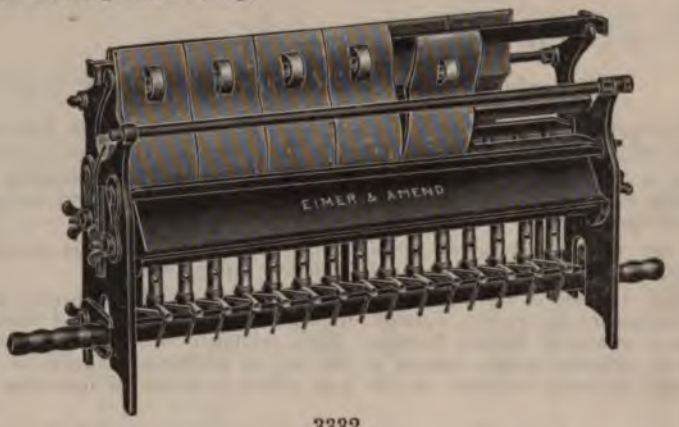
2 Units required for each of the above three furnaces.

Always specify voltage when ordering.

Other Arrangements of furnaces described under Nos. 3331 and 3331/2 are possible. For example the following arrangement is used by Rockefeller Institute.

3331/5. 1–3″ furnace, 2–6″ furnaces, and 2–3″ furnaces, making 5 furnaces altogether, with 5 rheostats and other attachments ..... **price on application**

When ordering state voltage.



3332

3332. **FURNACE—Combustion, Bunsen,** each burner fitted with stopcock and air regulator. Complete with clay tiles and gutters.

Length of heating surface, inches	13	21	25	30
Number of burners	10	15	20	25
Each	**40.00**	**45.00**	**55.00**	**65.00**

3332a. Extra Clay Tiles ..... each **.25**

3332b. Extra Clay Gutters ..... each **.20**

3334. **Ditto**—For gasoline gas, or natural gas. These furnaces are the same style as No. 3332, but fitted with E. & A. Universal burners.

Length of heating surface, inches	14	21	27	30
Number of burners	10	15	20	25
Each	**40.00**	**45.00**	**55.00**	**65.00**

3336. **FURNACE—Glaser,** fitted with mica plates so that the burner flames can be observed.

Length of heating surface, inches	15	27	33
Number of burners	10	21	26
Each	**50.00**	**70.00**	**80.00**

3336a. Extra Top Clays ..... each **.25**

3336b. Extra Side Clays ..... each **.25**

3336c. Extra Clay Gutters ..... each **.20**

3340

3342

3344

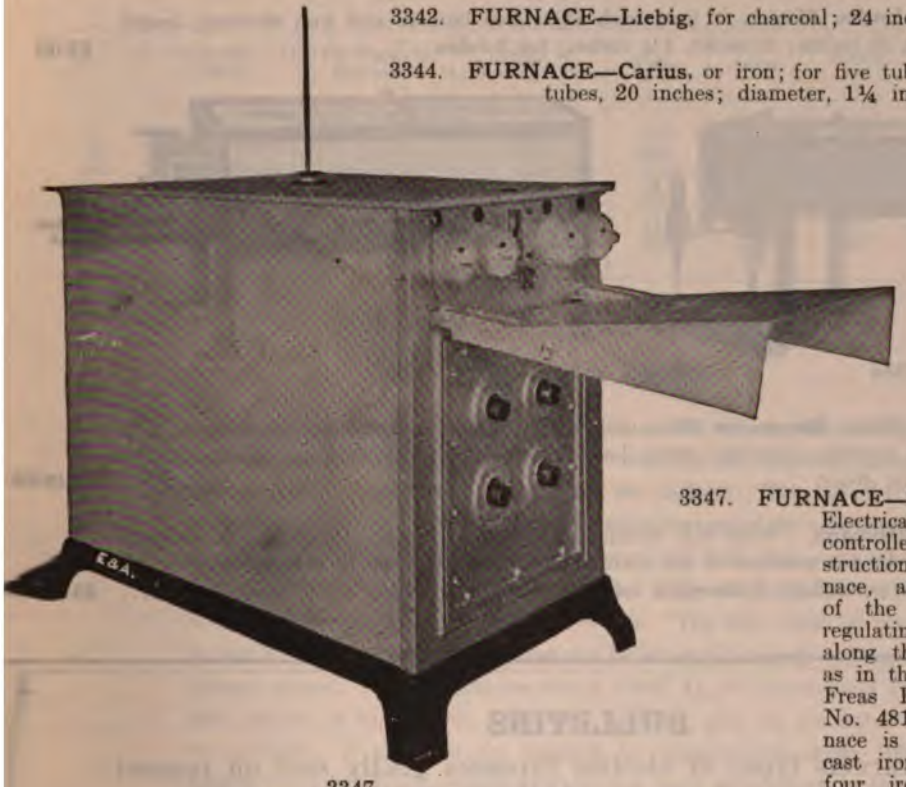
3338. **FURNACE—Fletcher,** low shape, for coal gas or gasoline gas. For draft or blast, with adjustable flame.

Length, inches	12	18	24
Each	**17.00**	**22.00**	**26.00**

3340. **Ditto**—with fixed length of flame; without blast..... **12.00** **15.00** **18.00**

3342. **FURNACE—Liebig,** for charcoal; 24 inches long **8.00**

3344. **FURNACE—Carius,** or iron; for five tubes, length of tubes, 20 inches; diameter, 1¼ inches **25.00**



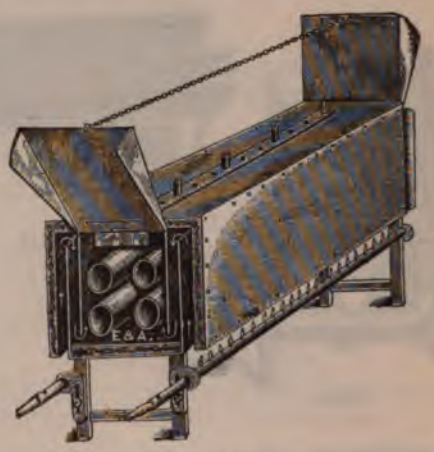
3347

3347. **FURNACE—Tube, Freas.** Electrically heated and controlled. The construction of this furnace, and operation of the heating and regulating devices are along the same lines as in the case of the Freas Electric Oven No. 4816. The furnace is fitted with a cast iron frame with four iron tubes 25 inches long, 1½ inches diameter, set in and properly supported. The iron frame at the front is provided with a heavy metal hood to prevent injury in case of an explosion. The indicator of the furnace is graduated for temperatures up to 200 degrees C., but can be built at short notice for other temperatures..... **235.00**

Organic Chemists have welcomed this furnace as a safeguard against untimely explosions so frequent with gas heated furnaces, due to fluctuating gas pressure, etc.

When ordering state voltage.

3350



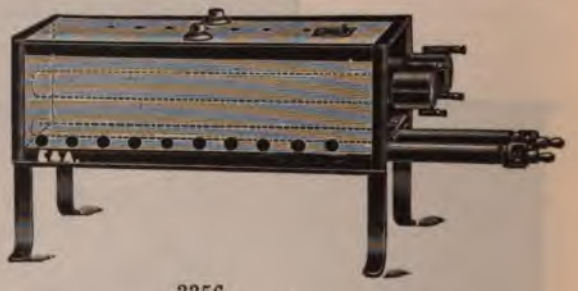
3352

3348. **FURNACE**—Erlenmeyer, of iron; for 2 tubes **17.50**

3350. **Ditto**—for 4 tubes **27.50**

3352. **FURNACE—Lothar Meyer,** of iron, with adjustable burners and iron shutters; length of tubes, 25 inches; diameter, 1¼ inches; for 4 tubes **63.00**

3354



3356

3354. **FURNACE—Victor Meyer,** for filling with water. Made of strong galvanized iron, with asbestos covering, constant water level arrangement; for 4 tubes, which may be heated by steam **40.00**

3356. **FURNACE—Ullmann.** With this furnace the pressure within the tubes is counterbalanced by the pressure of the surrounding liquid (benzine or ether), which eliminates the possibility of the glass tubes cracking **85.00**

BULLETINS

describing various types of electric furnaces gladly sent on request. Particular attention is directed to bulletins descriptive of the regular **Multiple Unit** and the special **Hevi-Duty** electric furnaces. Bulletin explaining Pyrometers for use with electric furnaces also sent on request.

3357

3357. **FURNACE—Combustion Tube Electric,** the heating body consists of a tube of highly refractory porcelain around which is coiled a ribbon of platinum foil, complete with adjustable series rheostat.

No.	Inside Diam.	For Temp. to degrees C.	Length of Heating Tube	Volts	Amps.	Weight lbs.	Weight of Rheostat lbs.	Price
1	4 to 5″	1400	24″	110	22	27	50	**196.20**
2	4 to 5″	1400	24″	220	11	27	50	**196.20**
17	2″	1300	24″	110	32	35	85	**328.00**
18	2″	1300	24″	220	16	35	85	**328.00**
6	1 3/16″	1350	24″	110	27	27	75	**249.00**
7	1 3/16″	1350	24″	220	13½	27	75	**249.00**

REACTION TUBES

Reactions requiring the exclusion of air or the introduction of any particular gas are best carried out in a separate inner reaction tube running through the furnace tube proper and somewhat longer than the furnace. They should project 6 to 8 inches on either side. In this way an undue heating of the tube ends is avoided and the ends are closed by caps, which are provided with inlet and outlet tubes for the gas. One of the caps is fitted with a mica observation window and the other with a tube for the insertion of a thermo-couple. The tube must be placed in position before heating the furnace and must not be allowed to touch the heating tube of the furnace proper. For temperatures above 1000° C., we recommend Impervite tubes, matt glazed on the outside. We can, however, give no guarantee that the tubes are air-tight. If they are not required for temperatures above 1000° C., we can supply tubes of glazed porcelain, which are most satisfactory in this respect.

Reaction tube only as above, without furnace or rheostat.

	No.	For Furnace Nos.	Diameter inside	Length	Price
3357a.	6	6 or 7	⅞″	36″	**14.40**
3357b.	17	17 or 18	1½″	36″	**18.00**

Multiple Unit Electric Furnaces

3359

Type 77. Standard Combustion Tube Furnace—shown with one "Spare" unit

USES

Furnaces of this type, while designed primarily for combustion work, have been used extensively for enameling or hardening tubes, rods, helical springs, etc., and for Pyrometer Calibration. The principal use is in the determination of the content of carbon in steel and iron.

HINGED DESIGN COMBUSTION FURNACES

No. 3361 offers a convenient form of combustion furnace where standard combustion work or special organic analysis is required.

TIME REQUIRED IN HEATING

The Standard Combustion Furnace No. 3359 reaches 1832° F. (1000° C.) in 45 to 50 minutes' time. The Hinged Combustion Furnace, No. 3361, reaches the same temperature in 40 to 45 minutes.

TEMPERATURE

These Combustion Tube Furnaces have a safe working temperature for constant duty of 1832° F. (1000° C.) and a maximum temperature for intermittent work of comparatively short duration, 1950° F. (1065° C.).

VOLTAGES

Unless otherwise specified, these Combustion Tube Furnaces are interchangeable for 110 or 220 volts—made interchangeable for either voltage by means of selective plug supplied with furnace.

Use 110 volts where possible. 110-V. Furnaces are wound with No. 17 wire, .045" diameter. Interchangeable Voltage Furnaces or furnaces for 220-V. are wound with No. 20 wire, .032" diameter. The larger wire, not possible in 220-V. furnaces, greatly increases the life of the wire.

Furnaces for any voltage other than 110 and 220 volts up to 250 volts are wound special at an extra price. Furnaces of standard rating either 220 or 110 volts may be used on all voltages, 215 to 230 volts or 105 to 115 respectively.

EQUIPMENT

Each furnace is equipped with six feet of Flexible Leads and Connector Plug. Instruction tag attached to furnace.

SPECIAL SIZES

Special Combustion Furnaces having heated chamber dimensions of 1¼", 2⅜", or 3" and of any length may be supplied on special order. Prices quoted on application.

3361
Combustion Furnace, Hinged Design, Type 70.
Shown with one "Spare" Unit

RHEOSTATS

Because of the exactness with which all combustions are developed it is practically necessary that rheostats be used.

It has been definitely shown by careful test work that a variance of 90° F. (50° C.) may cause a variance of .01% either way from the exact content of the sample.

PYROMETER CALIBRATION

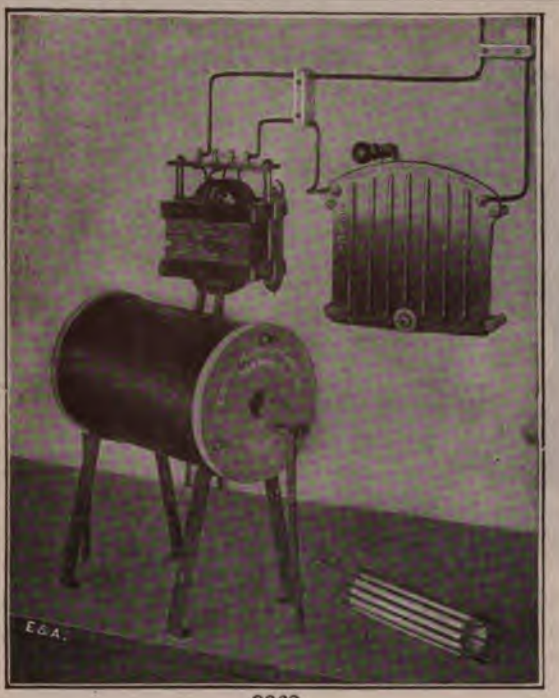
Because of the absolute uniformity of temperature and the definiteness of control, the Standard Combustion Tube Furnace, when fitted with a Silica Tube, is without equal for Pyrometer Calibrations. Price of Silica Tubes is extra.

	Type	Sizes (Inside)		Price Furnace	Price Rheostat	*Price Silica Tubes Glazed inside 24"x¾"	Price Extra Units	Refractory Only	Coiled Wire Only
		Diameter	Length						
3359.	77	1¼"	12"	**30.00**	**12.00**	**5.20**	**5.00**	**3.00**	**2.00**
3361.	70	1¼"	12"	**45.00**	**14.00**	**5.20**	**6.00**	**3.00**	**3.00**

Type	Energy Consumption					Weight, in pounds			
	Rating		Watts	In Reaching 1832° F. (1000° C.) From 75° F.	Holding 1832° F. (1000° C.) Per Hour	Furnace Only	Rheostat	Boxed Furnace Only	With Rheostat
	110 V.	220 V.							
77	5.1 Amps.	5.55 Amps.	560	.355 K.W.	.400 K.W.	17	4	25	29
70	6.8 "	3.4 "	750	.420 "	.615 "	25	7	33	40

* For other **Silica** and for **Alundum Tubes,** see **Tubes.**

The above combustion furnaces are for regular work at temperatures below 1000° C. For many combustions, however, a higher temperature is advantageous. To meet this need the replaceable unit "Hevi-Duty" combustion furnaces have been developed. They are suitable for continuous operation at temperatures not exceeding 1100° C. For description, see next page.



3362

3362. **FURNACE—Combustion, Replaceable Unit, Hevi-Duty.** Size inside 1¼" x 10". Tube center, 10" from bench.

This furnace is the most economical of all Electric Combustion Tube Furnaces. Operating at 2000° F., 1900° F., 1800° F. and at 1600° F., the furnace consumes 430 watts, 375, 325, and 240 watts, respectively, per hour. It has a maximum demand of 7/10 K.W.; attains 2000° F. in 35 to 40 minutes' time.

Protecting sleeve, shown in cut, is of greatest advantage and is an exclusive feature of the Hevi-Duty furnace; cut shows Type HD99 Single Tube Combustion Furnace complete with Transformer and Regulating Rheostat. Spare Protecting Sleeve and Return Bend Coil shown in right-hand lower corner.

Apparatus	Dimensions (in inches) and Weight (in pounds)				Sizes boxed	Shipping Weight	Price
	Sizes Over all			Net Weight			
	Width	Height	Depth				
Furnace	7	13½	11	15	9¾x18½x17	55	35.00
a. Rheostat	11	11	3	8	boxed with furnace		14.00
b. 60 cycle Transformer	6½	8	4½	20	11x11¾x12¾	30	30.00
c. 25 cycle Transformer	8	8½	5	32	11x11¾x12¾	45	40.00

Total shipping weight 60 cycle, 85 lbs.; 25 cycle, 100 lbs.

3362/5

3362/5. **FURNACE—Hevi-Duty.** Size inside 2" x 10"; furnace 12" wide. Tube Centers, 10" from bench. Tubes are 2¼" center to center.

Maximum demand or full load rating, 3.4 K.W. Attains 2000° F. in 1 hour and 20 minutes. Operating at 2000° F. and 1800° F., the furnace consumes 1.87 and 1.43 K.W., respectively, per hour.

Heating elements, readily renewable, consist of two return bend coils of No. 4 B. & S. gauge wire, .204" diameter, one each in the top and bottom unit plates. Unit plates diffuse the heat giving absolute uniformity of temperature in all five tubes. One of the asbestos face plates is provided with a hole for insertion of pyrometer couple.

Switch panel (not indicated in cut) has two seven-point radial switches giving 49 steps of temperature control between 1500° C. (815° C.) and 2000° F. (1100° C.).

Apparatus	Dimensions (in inches) and Weight (in pounds)				Sizes boxed	Shipping Weight	Price
	Sizes Over all			Net Weight			
	Width	Height	Depth				
Furnace	16	14¾	12½	65	25 x19½x21½	150	140.00
a. 60 cycle Transformer	12	29	14	170	15¾x17½x32	240	195.00
b. 25 cycle Transformer	12	31	17	270	15¾x20½x34	350	240.00

Total shipping weight, 60 cycle, 390 lbs.; 25 cycle, 500 lbs.

Muffle Furnaces

3363

Standard Muffle Furnace, Types 50, 52, 54 and 56, with one each "Spare" Top (or bottom) and Side units.

3365

Incased-Rheostat Muffle Furnace, Types 60, 62, 64 and 66. Door, shown Top-Hinging, is Reversible for Bottom-Hinging, same as shown in 3363.

Doors as shown are supplied an all sizes except 56 and 66, which are regularly furnished with Vertical counter-weighted Sliding doors. All other sizes can also be equipped with these Sliding Doors at no additional cost if specified on the order.

USES

Multiple Replaceable Unit Muffle Furnaces may be effectively used to increase the efficiency of any heat treating operation where any other make of electric furnace or any gas, oil or fuel fired furnaces have been used heretofore. They are used for all laboratory operations, such as drying precipitates, ash determinations, fusions, ignitions, heating metals and alloys; also for enameling jewelry, watch and clock dials, etc.; for annealing metals; for hardening high carbon steels, such as safety razor blades, dies, punches, milling and form cutters; and for experimental test work.

TEMPERATURES

All Muffle Furnaces have a safe working temperature for continuous duty of 1750° F. (955° C.) and a maximum temperature for intermittent work of comparatively short duration 1850° F. (1010° C.).

TIME REQUIRED IN HEATING

On all normal voltages of standard rating, any Muffle Furnace reaches 1400° F. (760° C.) in 30 to 35 minutes time; 1800° F. (982° C.) in 50 minutes time.

A type 50 Muffle Furnace, starting from cold and developing 1600° F. (870° C.) in 34 minutes time, showed an actual surface temperature on the furnace shell of only 110° F. (43° C.). In subsequent time, there is but a small increase of surface temperature—the heat loss, therefore, through radiation is a very small per cent. This is characteristic of all types.

The high efficiency of the heat insulation lessens the duty performed by the resistor wire, because the current flowing is of small volume compared to the actual carrying capacity of the wire, and the result is greatly prolonged life.

FRONT DOORS

Doors, except sizes 56 and 66, are reversible for hinging at bottom of door opening, as shown in Cut 3363, or for hinging at top—as shown in Cut 3365. Types 56 and 66 have Vertical Counter-Weighted Sliding Doors. Sliding doors on other sizes may be supplied at no additional price.

All doors have a ¾" diameter clear vision Mica Peephole, air tight, and are vastly superior to the pivoted suspended covers used on similar furnaces of other makes. The Mica covered hole permits observation at all stages of operation without admission of air which sometimes would be a serious disadvantage.

REAR DOORS

Rear doors, at extra prices, may be supplied in any size or type of Muffle Furnace. Such doors are of the Plug Type, not hinged and require actual withdrawal from the furnace in opening. Each rear door is provided with the standard Vent Hole and with a suitable handle.

EQUIPMENT

Each furnace is equipped with six feet of flexible leads and connector plug. Full instructions, for attaching to the Line Circuits, and Method of Operation, are given on Instruction Tag attached to each furnace.

All furnaces have a ⅞" diameter Vent Hole or Pyrometer Couple Hole in the rear head. An asbestos molded plug is supplied for closing Vent Hole.

3363. **FURNACE—Standard Muffle, Replaceable Unit.** This design is used without Rheostat or with Separate Rheostat. Shown in cut on preceding page. It has a metal shelf under furnace body which offers a convenient place for temporarily placing tongs, crucibles, etc.

Type No.	Inside Size, Inches			Prices		Extra Units		Refractory Only		Rear Doors Extra
	Wide	High	Deep	Furnace Only	With Rheostat	Top (or Bottom)	Side	Top	Side	
50	3¼	2½	7	**70.00**	**84.00**	**4.50**	**3.50**	**2.75**	**2.25**	**6.00**
52	4¼	3	10	**85.00**	**101.00**	**7.00**	**5.25**	**4.25**	**3.25**	**7.00**
54	5¼	3¾	12	**115.00**	**136.00**	**10.50**	**7.50**	**6.00**	**4.00**	**8.50**
56	7½	5¼	14	**150.00**	**185.00**	**15.75**	**10.75**	**9.00**	**6.00**	**10.00**

NOTE—Always specify voltage when order includes rheostat.

3365. **FURNACE—Incased-Rheostat Muffle, Replaceable Unit.** Built with rheostat mounted in housing below the furnace body, shown in cut on preceding page. It not only presents the rheostat in position for most convenient use, but eliminates considerable wiring which otherwise would be exposed and somewhat unsightly.

Type No.	Inside Size, Inches			Prices	Extra Units		Solid Wire Only		Rear Doors Extra
	Wide	High	Deep		Top (or Bottom)	Side	Top	Side	
60	3¼	2½	7	**90.00**	**4.50**	**3.50**	**2.75**	**2.25**	**6.00**
62	4¼	3	10	**110.00**	**7.00**	**5.25**	**4.25**	**3.25**	**7.00**
64	5¼	3¾	12	**145.00**	**10.50**	**7.50**	**6.00**	**4.00**	**8.50**
66	7½	5¼	14	**200.00**	**15.75**	**10.75**	**9.00**	**6.00**	**10.00**

Please state voltage when ordering.

Energy Consumption of above Muffle Furnaces

Type No.	110 V.	220 V.	Watts	In Reaching 1400° F. (760° C.) From 75° F.	Holding 1400° F. (760° C.) Per Hour
50 or 60	9.1 Amps.	4.55 Amps.	1000	.5 K.W.	.39 K.W.
52 or 62	13.1 "	6.55 "	1440	.72 "	.89 "
54 or 64	18.8 "	9.4 "	2070	1.2 "	1.37 "
56 or 66	31.0 "	15.5 "	3400	2.0 "	2.5 "

NOTE—Cost of Muffles is eliminated in Multiple Unit Furnaces.

In Multiple Replaceable Units the "Coiled Wire" is completely imbedded within the "Refractory," yet the "Coiled Wire" is easily renewable by the user. "Make your own repairs with 'Coiled Wire.'"

The Units of all Multiple Unit Muffle Furnaces are reversible for using either the open groove or closed face, presented to the muffle chamber. When assembled with the closed faces presented to the heated chamber, the time required for heating is only 3% slower than the Open Groove System—made possible by the high thermal conductivity of the unit material.

Voltage Prices

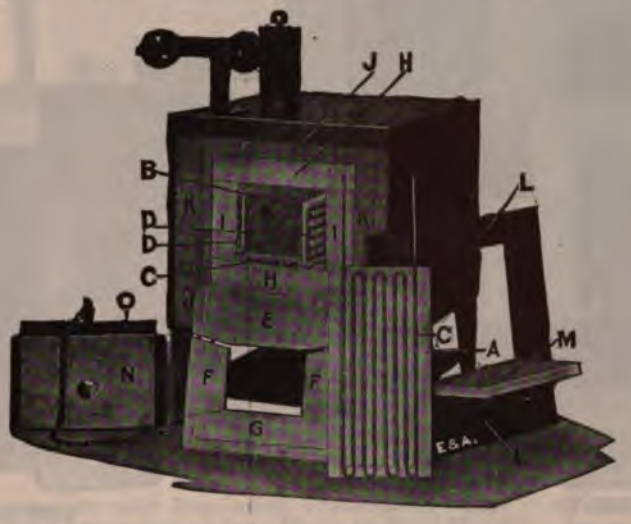
Above Furnace prices apply for all voltages 105 to 115 volts and 215 to 230 volts. Add 5% to such prices for all other voltages up to 250 volts. (No extra charge on rheostats in 250 volts.)

"Complete Unit" prices and "Coiled Wire Only" prices as above given apply for all voltages 105 to 115 volts and 215 to 230 volts. Add 20% to "Coiled Wire Only" prices for all other voltages up to 250 volts. (No extra charge on "Refractory Only" prices.)

STANDARD WIRING FOR 110 VOLTS IS CORRECT FOR 105 TO 115 VOLTS; 220-VOLT WIRING IS CORRECT FOR 215 TO 230 VOLTS.

Always give Serial Number, Type and Voltage when ordering extra parts.

Hevi-Duty Muffle Furnaces



Muffle Furnace, Head removed for renewal of Muffle Plates or Return Bend Coils. Lettered parts indicate the following:—**A**—Top or Bottom Muffle plates; **B**—Side Muffle Plates; **C**—Top or Bottom Return Bend Coils; **D**—Side Return Bend Coils; **E**—Top Face Plate; **F**—Side Face Plates; **G**—Bottom Face Plate; NOTE—that top and bottom Face Plates have two dowels engaging the side Face Plates. **H**—Top or Bottom Inner Housing Bricks; **I**—Side Inner Housing Bricks; **J**—Top or Bottom Outer Housing Bricks; **K**—Side Outer Housing Bricks; **L**—Front Head; **M**—Asbestos Shelf; **N**—Door Brick; **O**—Complete Door with Chain; **P**—(not shown), Rear Inner Housing Brick; **Q**—(not shown), Rear Outer Housing Brick.

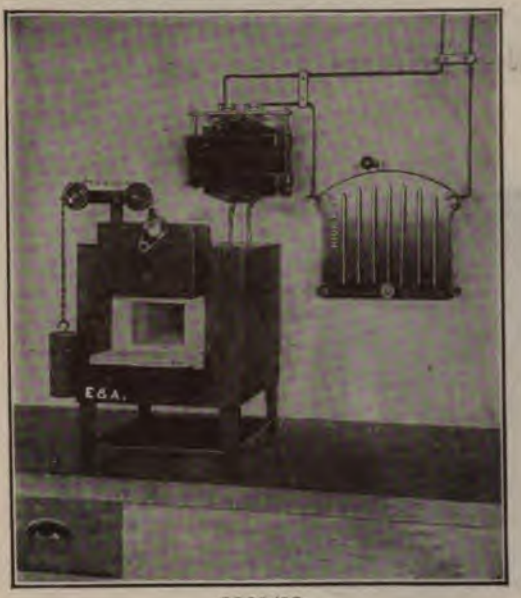
Immediately next to the unit refractories of HEVI-DUTY Furnaces is a surrounding wall of Housing Bricks of pressed Infusorial Earth.

The blocks forming such bricks are formed at high pressure and then pass through a kiln process of at least 2000° F., and consequently always maintain their true form. This high temperature Infusorial Earth insulation is, in turn, enclosed in a second or outer layer of housing bricks also composed of Infusorial Earth, but of the greatest efficiency for the temperatures which reach such outer layer. Housing bricks are in turn incased in steel shells of rigid construction. Furnace heads are of moulded asbestos, or combinations of all steel type and asbestos face plates.

The front heads of all muffle furnaces are of the steel and asbestos face-plate type. The steel heads are protected from the heat of the furnace by means of the Asbestos Face Plates and therefore indestructible. The Face Plates are of comparatively small size, multiple in number, and readily replaceable at an expense small as compared to the expense of replacing an all asbestos front head used in other makes of low voltage muffle furnaces. While the moulded asbestos parts stand the 2000° F. for a remarkable period of time, they may eventually require replacement. The asbestos Face Plates of HEVI-DUTY Furnaces are replaced without machine work being necessary.

The rear head of each Muffle Furnace is equipped with a ⅞" diameter vent or pyrometer couple hole, with suitable moulded asbestos plug for stopping hole when so desired.

Each HEVI-DUTY Furnace is susceptible to definite temperature control by means of the auxiliary equipment supplied with each furnace. Types 99, 92, and 46 are supplied with rheostats for controlling the primary or line circuit of the transformer, and therefore secondary voltage and furnace temperature. All other sizes have transformers equipped with slate panels. Switches of such panels control the secondary voltage delivered to the furnace terminals. The furnace temperature varies with the voltage at the furnace.



3366/92

Muffle Furnace complete with Transformer and Controlling Rheostat.

3366/96

Muffle Furnace with Regulating Transformer. Extra Top or Bottom Muffle Plate with Return Bend Coil shown under furnace, and a Side Muffle Plate with Return Bend Coil leaning against transformer.

3366/92. **FURNACE—Muffle, Replaceable Unit, Hevi-Duty.** Size inside 4″ wide, 3″ high, 10″ deep. Floor of furnace chamber 9″ from bench.

Maximum demand or full load rating 1.7 K.W. Attains 2000° F. in one hour and 10 minutes. Operating at 2000° F., 1800° F., and 1400° F., the furnace consumes 1.05, .8, and .4 K.W., respectively, per hour.

Heating elements consist of four return bend coils, one each in the top and bottom Muffle Plate; and one each in the side Muffle Plates. Top and bottom coils, also top and bottom muffle plates, are interchangeable. Side coils, also side muffle plates, are interchangeable. Coils are of No. 8 B. & S. Gauge wire, .128″ diameter.

The rheostat supplied as part of complete equipment, controls the voltage of primary and therefore the voltage of the furnace terminals. Rheostat gives 20 steps of temperature control in a range between 1000° F. (540° C.) and 2000° F. (1100° C.).

Rear head is provided with ⅞″ hole for pyrometer Couple, or for escape of fumes. Peephole cover on front door has clear vision mica insert. Cover is automatically retained open for unobstructed vision when so desired as shown in cut.

Apparatus	Dimensions (in inches) and Weight (in pounds)				Sizes Boxed	Shipping Weight	Price
	Sizes Over all			Net Weight			
	Width	Height	Depth				
Furnace	12½	21	20½	70	19x24¾x23	125	**115.00**
a. Rheostat	11	11	3	8	boxed with furnace		**21.00**
b. 60 cycle Transformer	9½	7	6¼	55	12x13x16	70	**65.00**
c. 25 cycle Transformer	11	8	7	90	12x13x16	110	**85.00**

Total shipping weight, 60 cycle, 195 lbs.; 25 cycle, 235 lbs.

3366/96. **FURNACE—Muffle, Replaceable Unit, Hevi-Duty.** Size inside, 8″ wide, 5″ high, 12″ deep. Floor of Furnace Chamber 10½″ from bench.

Maximum demand or full load rating 4.3 K.W. Attains 2000° F. in 1 hour and 15 minutes. Operating at 2000° F., 1900° F., and 1400° F., the furnace consumes 1.9, 1.3 and .8 K.W., respectively, per hour.

Switch panel having two five-point radial switches and one double pole double throw switch, gives 50 steps of temperature control between 500° F. (260° C.) and 2000° F. (1100° C.).

Other details are similar to No. 3366/92.

Apparatus	Dimensions (in inches) and Weight (in pounds)				Sizes Boxed	Shipping Weight	Price
	Sizes Over all			Net Weight			
	Width	Height	Depth				
Furnace	18¼	27½	24	150	26 x30½x28½	250	**155.00**
b. 60 cycle Transformer	13	34	14	190	15¾x17½x38½	265	**195.00**
c. 25 cycle Transformer	13	36½	17½	300	15¾x22½x40	370	**240.00**

Total shipping weight, 60 cycle, 515 lbs.; 25 cycle, 620 lbs.

3366/114

Muffle Furnace complete with Regulating Transformer—door removed showing secure retention of Face Plates by Steel Head.

Stand of Muffle Furnaces Types 122, 128 and 136 as collapsed for shipment. Packs in case with furnace.

3366/114. FURNACE—Muffle. Replaceable Unit, Hevi-Duty. Size inside, 12″ wide, 6″ high, 14″ deep. Floor of Furnace chamber, 11½″ from bench.

Maximum demand or full load rating, 6.8 K.W. Attains 2000° F. in 1 hour and 15 minutes. Operating at 2000° F., 1800° F., and 1400° F., the furnace consumes 2.35, 1.85 and 1.1 K.W., respectively, per hour.

Heating elements consist of six return bend coils, two each in the top and bottom muffle plates and one in each of the two side muffle plates. The six coils are interchangeable throughout. Coils are of No. 4 B. & S. gauge wire, .204″ diameter. Top and Bottom Muffle Plates, also Side Muffle Plates, are interchangeable.

Switch panel, having two five-point radial switches and one double pole double throw switch, gives 50 steps of temperature control between 500° F. (260° C.) and 2000° F. (1100° C.).

Rear head is provided with ⅞″ diameter hole for Pyrometer Couple, or for escape of fumes. Peep hole cover on front door has clear vision mica insert. Cover is automatically retained open for unobstructed vision when so desired (as shown in Cut).

Apparatus	Dimensions (in inches) and Weight (in pounds)				Sizes Boxed	Shipping Weight	Price
	Sizes Over all			Net Weight			
	Width	Height	Depth				
Furnace	24	31	26	255	35 x31¼x31¼	375	**285.00**
b. 60 cycle Transformer	13	35	17	266	15¼x22½x38	340	**245.00**
c. 25 cycle Transformer	13	37½	20	425	15¼x25½x41	510	**295.00**

Total shipping weight, 60 cycle, 715 lbs.; 25 cycle, 885 lbs.

3366/122. FURNACE—Muffle. Replaceable Unit Electric, Hevi-Duty. Size inside, 12″ wide, 8″ high, 22″ deep. Floor of Furnace Chamber, 40″ from shop floor.

Maximum demand or full load rating 11.0 K.W. Attains 2000° F. in 1 hour and 15 minutes. Operating at 2000° F., 1800° F., and 1400° F., the furnace consumes 4.25, 2.4 and 1.25 K.W., respectively, per hour.

Heating elements consist of 6 return coils, two each in the top and bottom muffle plates, and one in each of the two side muffle plates. Coils are of No. 4 B. & S. gauge wire, .204″ diameter. Top and bottom coils, also top and bottom muffle plates, are interchangeable. Side coils, also side muffle plates, are interchangeable. Muffle plates of 14″ and 8″ sections compose the 22″ depth of furnace chamber.

Switch panel having two six-point radial switches and one double pole double throw switch gives 72 steps of temperature control between 500° F. (260° C.) and 2000° F. (1100° C.).

Hole in rear head (for Pyrometer Couple, or for fumes) and Peep hole cover of front door are same as for Type 114.

Apparatus	Dimensions (in inches) and Weight (in pounds)				Sizes Boxed	Shipping Weight	Price
	Sizes Over all			Net Weight			
	Width	Height	Depth				
Furnace	24	64	35	385	46 x36 x33	555	**370.00**
b. 60 cycle Transformer	13	42	18½	355	15½x23½x45	445	**285.00**
c. 25 cycle Transformer	13	45	22	580	15½x27 x48	685	**340.00**

Total shipping weight, 60 cycle, 1000 lbs.; 25 cycle, 1240 lbs.

3366/128

3366/128. FURNACE—Muffle, Replaceable Unit, Hevi-Duty. Size inside, 12″ wide, 8″, high, 28″ deep. Floor of furnace chamber, 40″ from shop floor.

Maximum or full load rating 13.0 K.W. Attains 2000° F. in 1 hour and 20 minutes. Operating at 2000° F., 1800° F., and 1400° F., the furnace consumes 4.32, 2.87 and 1.62 K.W., respectively, per hour.

Heating elements consist of six return bend coils, two each in the top and bottom muffle plates, and one in each of the two side muffle plates. Coils are of No. 4 B. & S. gauge wire, .204″ diameter. Top and bottom coils, also top and bottom muffle plates, are interchangeable. Side coils, also side muffle plates, are interchangeable. Two sections of muffle plates, each 14″ long, compose the 22″ depth of furnace chamber.

Switch panel having two six-point radial switches and one double pole double throw switch gives 72 steps of temperature control between 500° F. (260° C.) and 2000° F. (1100° C.).

Hole in rear head (for Pyrometer Couple, or for fumes) and Peep hole cover of front door are same as for Type 114.

Apparatus	Dimensions (in inches) and Weight (in pounds)				Sizes Boxed	Shipping Weight	Price
	Sizes Over all			Net Weight			
	Width	Height	Depth				
Furnace	24	64	41	460	52¼x35½x32¾	675	**430.00**
b. 60 cycle Transformer	13	42	19	350	15½x23½x45	440	**325.00**
c. 25 cycle Transformer	13	46	22½	620	15½x27 x49	725	**395.00**

Total shipping weight, 60 cycle, 1115 lbs.; 25 cycle, 1400 lbs.

3366/136. FURNACE—Muffle, Replaceable Unit, Hevi-Duty. Size inside, 12″ wide, 8″, high, 36″ long. Floor of furnace chamber, 40″ from shop floor.

Maximum or full load rating 15.0 K.W. Attains 2000° F. in 1 hour and 20 minutes. Operating at 2000° F., 1800° F., and 1400° F., the furnace consumes 4.44, 3.33 and 2.07 K.W., respectively, per hour.

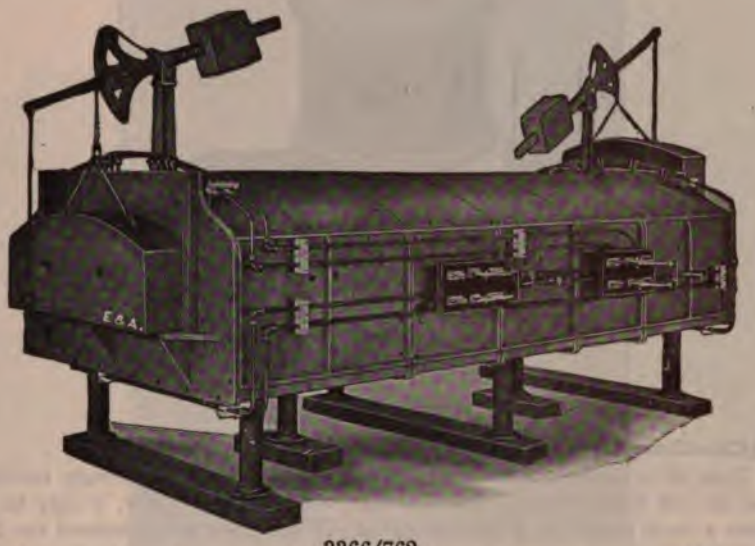
Heating elements consist of six return bend coils, two each in the top and bottom muffle plates, and one in each of the two side muffle plates. Coils are of No. 4 B. & S. gauge wire, .204″ diameter. Top and bottom coils, also top and bottom muffle plates, are interchangeable. Two sections of muffle plates, 14″ long and one 8″ section, compose the 36″ depth of furnace chamber.

Switch panel having two six-point radial switches and one double pole double throw switch gives 72 steps of temperature control between 500° F. (260° C.) and 2000° F. (1100° C.).

Hole in rear head (for Pyrometer Couple, or for fumes) and Peep hole cover of front door are same as for Type 114.

Apparatus	Dimensions (in inches) and Weight (in pounds)				Sizes Boxed	Shipping Weight	Price
	Sizes Over all			Net Weight			
	Width	Height	Depth				
Furnace	24	64	49	540	61 x36 x32¾	770	**500.00**
b. 60 cycle Transformer	13	43	19	390	15½x23½x46	490	**385.00**
c. 25 cycle Transformer	13	47	23	650	15½x27½x50	760	**460.00**

Total shipping weight, 60 cycle, 1260 lbs.; 25 cycle, 1530 lbs.



3366/762

44" wide, 10" high, 12 feet long. Industrial types in any size

A **HEVI-DUTY** Furnace similar to above has been in operation for 22 months on 24 hour per day service at 1560° F. (850° C.), heat treating 33,000 pounds of metal each twenty four hours, consuming less than 140 kilowatts per hour. The user states that the *cost of operating* is about 60% *of the cost of operating a fuel-oil furnace* of equal capacity (1½ c. per K. W. and 7½ c. per gallon).

All sizes of **HEVI-DUTY** Furnaces are being used for Laboratory Operations, as well as for numerous heat-treating shop operations, such as pre-heating of High Speed Steel, Hardening and Annealing of High Carbon Steel tools, Enameling of Jewelry, including watch dials, Fusing of Bifocal Lenses, Annealing of Commercial Glassware, etc.

Characteristic of all MULTIPLE REPLACEABLE UNIT FURNACES and other devices of MULTIPLE UNIT design, each **HEVI-DUTY** Furnace has heating units or coils, and unit refractories multiple in number, each readily replaceable by the operator. Thus in the event of a burn-out of any one coil, or damage to any unit refractory, the coil may be replaced or repaired, or the one unit refractory replaced, leaving the other parts for additional service.

All return bend coils forming the resistor or heating elements of **HEVI-DUTY** Furnaces are held in proper alignment by means of grooves in the unit refractories. When inserted in the furnace chamber the coils are held in the grooves of the unit refractories by means of near contact with the furnace wall or housing bricks. Each return bend coil of any **HEVI-DUTY** Furnace has only two terminals extending through to the outside of rear head. There are six to thirteen strands per coil. This leaves the *maximum percentage of resistor or heating element entirely within the furnace chamber.* The terminals are connected to each other, or to the secondary leads of the transformer by means of special patented self-contained compression couplings. These couplings are thoroughly air-cooled and form a positive contact by means of a wedge and screw compression.

The wire or resistance used as the heating element in the return bend coils of **HEVI-DUTY** Units is a pure Nickel-Chromium alloy containing the best percentages of nickel and chromium to give the most constant and lasting qualities. The melting point is several hundred degrees above the safe continuous operating furnace temperatures.

Prices and specifications on application giving details of furnace requirements.

3367

Crucible Furnaces

VOLTAGES

3367. **FURNACE—Crucible, Replaceable Unit, Electric.**

Type 80 is designed for use on 110 or on 220 Volts. We strongly recommend its use on 110 Volts, because the amperage being extremely low, it may be operated from a lamp socket of a lighting circuit. When Type 80 is ordered for 220 Volts, a 220 Volt rheostat must be supplied. This furnace will not be furnished without rheostat. This is made necessary by the size of the crucible chamber prohibiting the use of wire sufficiently large in diameter to give satisfactory service at the higher voltage.

All other sizes, Types 82, 84 and 86, are interchangeable for 110 and 220 Volts.

TIME REQUIRED IN HEATING

Types 82, 84 and 86 reach 1400° F. (760° C.) in 25 to 30 minutes time; 1832° F. (1000° C.) in 45 to 50 minutes time.

Type 80 reaches 1400° F. (760° C.) in 15 minutes time and 1832° F. (1000° C.) in 30 minutes time.

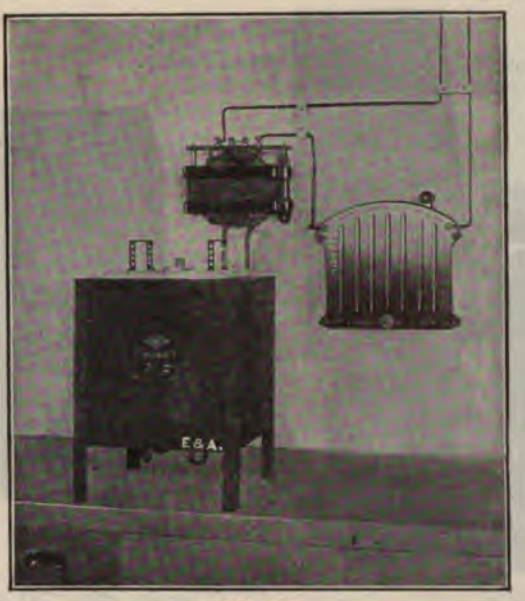
The excess speed of the Type 80 has been found desirable because mostly used for intermittent quick work in Decalescent Determination of carbon steel.

All Crucible Furnaces have a safe working temperature of 1832° F. (1000° C.) for continuous duty and a maximum temperature of 2000° F. (1095° C.) for comparatively short periods on intermittent work.

Type No.	Voltages	Dimensions in Inches				Prices		Spare Uni[illegible]	
		Inside Diam.	Inside Deep	Overall Diam.	Overall High	Furnace Only	With Rheostat	Each Extra	P[illegible] S[illegible]
80	110	2⅜	2½	7¾	8½	28.00	40.00	2.50	2
80	220	2⅜	2½	7¾	8½	must have rh.	42.00	2.50	2
82	110 & 220	2⅜	4	7¾	10	33.00	45.00	3.75	2
84	110 & 220	3	3½	8¾	11	42.50	54.50	4.00	2
86	110 & 220	3	5	8¾	12½	52.50	66.50	5.00	2

Type No.	Energy Consumption: Rating, Amperes 110 V.	220 V.	Watts	In Reaching 1400° F. (760° C.) From 75° F.	Holding 1400° F. (760° C.) per Hour	Weight, in pounds: Furnace Only	Rheostat	Boxed Furnace Only	Wit[illegible] Rheo[illegible]
80	3.55		390	.095 K. W.	.20 K. W.	9	4	16	20
80		3.55	780	.325 "	.40 "	9	7	16	30
82	4.4	2.2	484	.20 "	.25 "	10	4	22	26
84	5.0	2.5	550	.23 "	.325 "	13	4	25	29
86	6.6	3.3	725	.3 "	.37 "	15	4	30	34

NOTE—Always specify voltage when order includes rheostat.



3367/46
Complete with Transformer and Controlling Rheostat

REPLACEABLE UNIT ELECTRIC FURNACE FOR DETERMINING VOLATILE MATTER

Type 82 furnace (see preceding page) can be used satisfactorily for determining volatile matter, and is operated at a constant temperature of 950° C. for this purpose.

When this furnace is ordered for determining volatile matter, a small hole extending from the bottom of the furnace chamber through the bottom head for the admission of a platinum-rhodium couple as illustrated in figure 5, volume 9, No. 1, January, 1917, page 102, of the "Journal of Industrial and Engineering Chemistry," will be made without charge.

Customer must designate the diameter of hole desired. The cover may be drilled for supporting Nichrome combustion support. In this case, also, customer must specify dimension of drilling in the cover. The cover is made of moulded asbestos. This furnace fulfills the requirements as described in the "Journal of Industrial and Engineering Chemistry," volume 9, No. 1, January, 1917, page 102, also "Technical Paper" No. 76, Bureau of Mines, page 21.

In addition to the regular price of the furnace, there will be an added cost for the special lifting device.

Hevi-Duty Crucible Furnaces

3367/46. **FURNACE—Crucible, Replaceable Unit, Hevi-Duty.** Top opening 4" square, 6" deep. Maximum or full load rating, 2.2 K.W., attains 2000° F. in 30 minutes. At 2000° F., 1800° F. and 1400° F., consumes .74, .58, and .32 K.W., respectively, per hour.

Has four interchangeable coils and four interchangeable Crucible Plates. Coils are No. 8 B. & S. gauge wire, .128" diameter.

Rheostat secures 20 points of temperature control, 1000° to 2000° F.

Apparatus	Dimensions (in inches) and Weight (in pounds)				Sizes Boxed	Shipping Weight	Price
	Sizes Over all			Net Weight			
	Width	Height	Depth				
Furnace	12½	19	12½	60	17½x17½x25½	135	**75.00**
a. Rheostat	14	14	3	20	boxed with furnace		**21.00**
b. 60 cycle Transformer	9½	8½	6¼	50	12x13x16	70	**65.00**
c. 25 cycle Transformer	11	9½	7	80	12x13x16	100	**75.00**

3367/710

Crucible Furnace with Regulating Transformer. Extra or Spare Crucible Plate with Return Bend Coil shown standing against Furnace.

3367/1014

Crucible Furnace shown without Regulating Transformer

3367/710. **FURNACE—Crucible, Replaceable Unit, Hevi-Duty.** Top opening 7" square, 10" deep.

Full load, 4.0 K.W. Attains 2000° F. in 1 hour and 5 minutes. At 2000° F., 1800° F. and 1400° F., consumes 1.48, 1.0 and .63 K.W., respectively, per hour.

Has four interchangeable coils and four interchangeable Crucible Plates. Coils are No. 4 B. & S. gauge wire, .204" diameter.

Switches on panel give 50 points of temperature control 500° to 2000° F.

Apparatus	Dimensions (in inches) and Weight (in pounds)				Sizes Boxed	Shipping Weight	Price
	Sizes Over all			Net Weight			
	Width	Height	Depth				
Furnace	17¼	25	17¼	145	35¼x25 x25¼	240	**150.00**
b. 60 cycle Transformer	13	43	14	205	15¾x17½x45	285	**190.00**
c. 25 cycle Transformer	13	45½	17½	315	15¾x21 x48	405	**235.00**

3367/1014. **FURNACE—Crucible, Replaceable Unit, Hevi-Duty.** Top opening 10" square, 14" deep. Full load rating 7.0 K.W. Attains 2000° F. in 1 hour and 25 minutes. At 2000° F., 1800° F., and 1400° F. the furnace consumes 2.86, 2.35 and 1.21 K.W., respectively, per hour.

Has four interchangeable coils and four interchangeable Crucible Plates. Coils, No. 4 B. & S. gauge wire, .204" diameter.

Switches on panel give 72 points of temperature control 500° F. (260° C.) to 2000° F. (1100° C.).

Apparatus	Dimensions (in inches) and Weight (in pounds)				Sizes Boxed	Shipping Weight	Price
	Sizes Over all			Net Weight			
	Width	Height	Depth				
Furnace	22	31	22	265	42 x29¾x30	415	**225.00**
b. 60 cycle Transformer	13	43	16	280	15¾x23¾x46	370	**240.00**
c. 25 cycle Transformer	13	47	20	525	15¾x27½x50	630	**285.00**

Pyrometers to use with **HEVI-DUTY FURNACES**—See **Pyrometers.**

HEVI-DUTY REFRACTORIES

Type		Kind	No. per Unit	No per Set	Per Piece	Prices per Unit	Per Set
99		Protecting Sleeve	1	1	1.00	1.00	1.00
595		Unit Plate	1	2	4.00	4.00	8.00
46		Crucible plate	1	4	2.00	2.00	8.00
710		Crucible Plate	1	4	3.00	3.00	12.00
1014		Crucible Plate	1	4	7.00	7.50	30.00
92		Top Muffle Plate	1	2	2.25	2.25	8.00
92		Side " "	1	2	1.75	1.75	
96		Top " "	1	2	4.50	4.50	15.50
96		Side " "	1	2	3.25	3.25	
114		Top " "	1	2	9.00	9.00	28.00
114		Side " "	1	2	5.00	5.00	
122	14"	Top " "	1	2	9.00	15.00	50.00
122	8"	Top " "	1	2	6.00		
122	14"	Side " "	1	2	6.00	10.00	
122	8"	Side " "	1	2	4.00		
128	14"	Top " "	2	4	9.00	18.00	60.00
128	14"	Side " "	2	4	6.00	12.00	
136	14"	Top " "	2	4	9.00	24.00	80.00
136	8"	Top " "	1	2	6.00		
136	14"	Side " "	2	4	6.00	16.00	
136	8"	Side " "	1	2	4.00		

Type 122 has one 14" and one 8" muffle plate per Furnace length.
Type 128 has two 14" muffle plates.
Type 136 two 14" and one 8".

HEVI-DUTY RETURN BEND COILS

Type	Kind	Coils Per Unit	Coils Per Set	Per Coil	Prices Per Unit	Per Set
99	Single combustion	1	1	5.00	5.00	5.00
595	Five tubes	1	2	14.00	14.00	28.00
46	Crucible	1	4	3.00	3.00	12.00
710	"	1	4	9.00	9.00	36.00
1014	"	1	4	12.00	12.00	48.00
92	Top or Bottom Coil	1	2	4.25	4.25	16.00
92	Side Coil	1	2	3.25	3.25	
96	Top or Bottom Coil	1	2	11.00	11.00	35.00
96	Side Coil	1	2	6.50	6.50	
114	Top or Bottom Coil	2	4	8.00	16.00	48.00
114	Side Coil	1	2	8.00	8.00	
122	Top or Bottom Coil	2	4	11.00	22.00	74.00
122	Side Coil	1	2	15.00	15.00	
128	Top or Bottom Coil	2	4	15.00	30.00	99.00
128	Side Coil	1	2	19.50	19.50	
136	Top or Bottom Coil	2	4	19.50	39.00	130.00
136	Side Coil	1	2	26.00	26.00	

ASBESTOS FACE PLATES FOR HEVI-DUTY FURNACES

Type	Kind	Pieces in 1 Furnace	Price per Piece	Pieces in 1 full set	Price per Set
99	None used				
595	Holes for 5 Tubes	2	4.00	2	8.00
46	Top Face Plates	4	.50	4	2.00
710	" " "	4	.75	4	3.00
1014	" " "	4	1.25	4	5.00
92	" " "	1	.75	4	2.50
92	Side " "	2	.50		
92	Bot'm " "	1	.75		
96	Top " "	1	1.25	4	3.75
96	Side " "	2	.75		
96	Bot'm " "	1	1.00		
114	Top " "	1	1.50	4	4.75
114	Side " "	2	1.00		
114	Bot'm " "	1	1.25		
122, 128, or 136	Top " "	1	1.50	4	4.75
122, 128, or 136	Side " "	2	1.00		
122, 128, or 136	Bot'm " "	1	1.25		

3368

3368. **FURNACE—Electric Replaceable Multiple Unit, Rectangular type.**

This furnace is designed to permit ready access to any crucible in the furnace without disturbing the other crucibles. The furnace chamber cover is in three parts, with the exception of cover of type 83, which is divided in two. This allows removal of the cover adjacent to the crucible to be removed for observation, without appreciably cooling the heater chamber.

The furnace is a most satisfactory substitute for the blast lamp for temperatures up to about 900° C. It provides uniform heating, easy regulation, and cool surroundings. The furnace is used to advantage for the ignition of magnesium ammonium phosphate precipitates in the gravimetric method for the determination of phosphoric acid. Many other uses will suggest themselves. Temperatures: Maximum temperature is 1800° F. (980° C.).

Time required in heating: On normal voltages, 1400° F. in 40 to 45 minutes time; 1800° F. in 60 to 75 minutes.

Voltages: Not interchangeable; Voltage must be specified. Furnaces of standard rating, either 110 or 220 Volts may be used on 105 to 115 and 215 to 230 Volts respectively.

Renewal of Units: Units are renewed or replaced by the operator in the same way as in the case of the regular Multiple Unit Muffle or Crucible Furnaces.

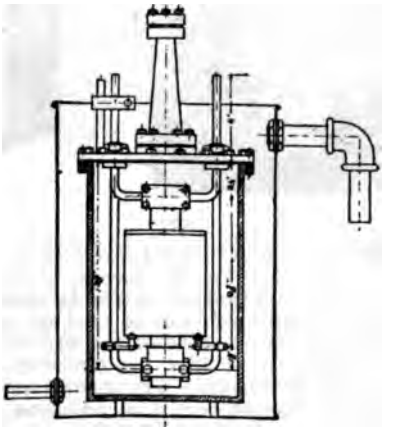
Caution: Because of some heat loss due to the vertical opening, and the type of covers which must be used, the efficiency of the Furnace is slightly lower than in the case of standard Multiple Unit Muffle Furnaces. This accounts for the greater length of time required in heating, and also the greater amount of current required to reach similar temperatures.

Inside Dimensions in Inches						Complete Unit (Refractory and coiled wire)			Coiled Wire Only			Refractory Only		
Type No.	Length	Width	Depth	Furnace	Rheostat	Bottom	Side	End	Bottom	Side	End	Bottom	Side	End
83	7	2¾	1¾	**65.00**	**14.00**	**3.50**	**3.50**	**2.50**	**1.75**	**1.75**	**1.50**	**1.75**	**1.75**	**1.00**
85	10	3¼	2	**82.50**	**16.00**	**5.75**	**5.75**	**4.00**	**3.00**	**2.75**	**1.75**	**2.75**	**3.00**	**2.25**
87	12	4	2⅝	**107.50**	**21.00**	**7.75**	**7.75**	**6.00**	**4.00**	**3.50**	**3.50**	**3.75**	**4.25**	**2.50**
89	14	5½	3¼	**135.00**	**35.00**	**10.75**	**10.75**	**7.50**	**6.00**	**5.50**	**4.50**	**4.75**	**5.25**	**3.00**

Current Consumed				Over all Dimensions		
Type No.	110 V.	220 V.	Watts.	Length	Width	Height
83	8 Amps.	4 Amps.	880	12½ in.	7⅞ in.	7¾ in.
85	11 "	5.5 "	1210	15⅝ "	8⅞ "	8 "
87	15 "	7.5 "	1650	17¾ "	9⅞ "	8¾ "
89	24.7 "	12.35 "	2720	21⅜ "	12⅞ "	10 "

1 bottom and 2 each side and end units are required for above furnaces.

MULTIPLE REPLACEABLE UNIT FURNACES and other devices of MULTIPLE UNIT design have heating units or coils, and unit refractories, multiple in number, each readily replaceable by the operator. Thus in the event of a burn out of any coil or damage to any unit refractory, the coil may be replaced or repaired or the one unit refractory replaced, leaving the other parts for additional service. Characteristic of all these furnaces is their low current requirement. For example, other Hevi-Duty furnaces on the market for the same temperature require approximately 50% more current than the MULTIPLE REPLACEABLE UNIT HEVI-DUTY furnaces referred to in the preceding pages.



3370

3370. **FURNACE—Electric, Arsem Vacuum,** small vertical type, especially used in the research laboratories of the U. S. Bureau of Standards .....**price on application**

The General design of the furnace comprises a heater of Graphite enclosed in a vacuum chamber, the heater being of such shape that it almost entirely encloses the object to be treated. The vacuum chamber is of steel with all joints made tight by lead gaskets.

The temperature can be quickly brought to any desired point, as determined by the calibration curve, and maintained constant for long periods, while the behavior of the article being heated may be observed through the mica window at the top. The range of temperature extends to 3100 deg. C., using a maximum of 15 K.W., but most experiments do not require a higher temperature than 2500 deg. C., which can be attained with 10 K.W.

This type of furnace is especially useful for small scale experiments that can be performed in crucibles 1½ in. diameter and 4 in. high.

Following are some of the uses:

Preparation of metals, alloys, carbides, silicides, and other compounds.

Determination of melting points of metals, alloys, glazes, slags, refractories, etc., by an optical pyrometer, or by reference to the furnace calibration curve.

Calibration of optical Pyrometers.

Distillation of refractory substances for separation or purification.

Study of equilibrium in reactions depending upon the pressure of the gaseous phase.

Many reactions can be studied quantitatively with accurately weighed

Automatic Temperature Control

3372

Automatic Temperature Control Instrument is shown in use with Muffle Furnace, type 62. (For the purpose of illustration, couple is shown in front door, instead of in regular location through rear head.) This control instrument can be used on any type of electric furnace. Solenoid operated switches automatically open and close the circuit, depending on whether the temperature is high or low as indicated by the Pyrometer. The instrument has an adjustable device and index pointer to permit of adjusting the instrument to open and close the circuit at any desired point on the temperature scale.

AUTOMATIC TEMPERATURE CONTROL—FOR USE WITH ELECTRIC FURNACES

In many processes it is desirable to maintain a constant temperature in a furnace. By means of the Multiple Unit Electric Furnaces and the automatic temperature regulator, illustrated above, it is possible to control the temperature within very close limits.

The furnace is started with the switch closed. When the temperature reaches any desired point, for example, 1400° F., the pointer is depressed on the high side of the contact-making device, and the electrical circuit is opened. This permits the temperature to drop a few degrees and the pointer is depressed again on the low side and the switch is closed. This operation is constantly repeated and the temperature can be controlled at any desired point.

A recording Pyrometer can be furnished if desired, so that a continuous record of the temperature will be secured on a separate instrument.

The Recording Instrument is often a source of efficiency in recording normal variations of repeated operations. Starting an operation may lower the temperature. The Recorder records the time of heating to final temperature.

PRICES OF AUTOMATIC CONTROL APPARATUS OF ELECTRIC FURNACES

	To 30 Amperes max. capacity	To 60 Amperes max. capacity
3372. **CONTROL INDICATOR COMPLETE**—with automatic solenoid-operated switch, relay and 24 inch (or shorter) base metal thermo-couple, as illustrated without furnace	**255.00**	**265.00**
3372/1. **Ditto**—Including Continuous Chart Recording Instrument	**555.00**	**565.00**

Note:—Voltage and kind of current, whether A. C. or D. C., must be specified. If A. C., specify the cycle.

"High-Temp" Electric Furnace

For temperatures up to 1800° C.
Operates on either Alternating or Direct Current lines up to 125 Volts.

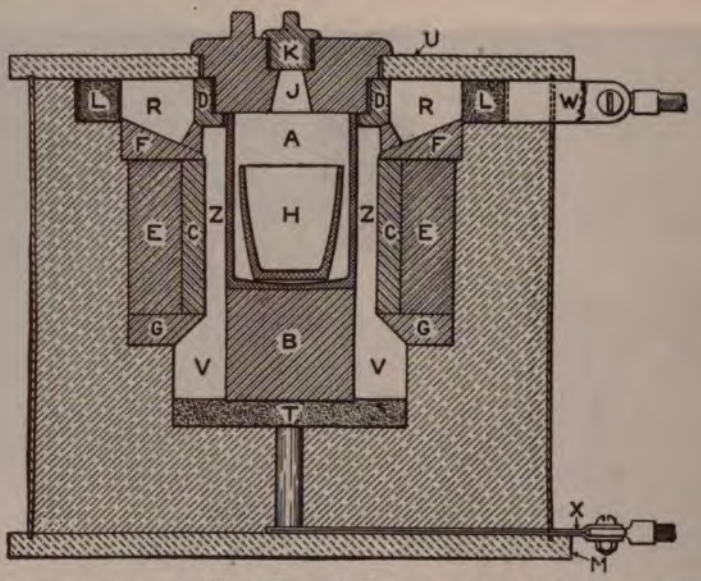
Several meritorious features are embodied in the **"High-Temp"** Furnace, the lack of which in high temperature furnaces heretofore offered has made them undesirable in many respects, and not within the reach of all workers, due to comparatively high selling prices made necessary by their construction and the cost of auxiliary apparatus generally necessary for operation on Alternating current.

The simplicity of operation, low current consumption, inexpensive replacement parts, and the moderate price of the complete outfit, establish the claim that the **"High-Temp"** Furnace is the most desirable high temperature outfit for research and general laboratory purposes.

Under normal heats the furnace reaches 1600° C. in about one hour, requiring a maximum load of approximately 40 Amperes and consuming about 2.75 K.W. in reaching this temperature. The furnace can be used equally as well for lower temperatures to about 500° C.

Dimensions: Size of heated chamber is 2¼ inches diameter, 3¾ inches deep. Outside dimensions of furnace, 14½ inches diameter, 19 inches high over all. Switchboard Panel is 1 inch black oil-finished slate, 17 inches wide, 26 inches high. Rheostat, which is mounted on the back, forms the mounting for the Panel—total depth from wall when mounted 9 inches.

Resistor Element: A special mixture of granular material is used as the resistor element. The sectional cut (see next page) shows the method employed in securing a heating zone "Z" which is formed by two concentric cylinders—"A" and "B" inside and "C" outside. The chambers "R", "Z" and "V" receive the granular resistor element. Portions of resistor element "R" and "V" being of large cross sectional area have low resistance—hence heat is developed only in the zone "Z". Parts "L" and "T" are graphite electrodes forming contact with the granular resistance material and through such graphite to copper busbars "W" and "X". When used under normal conditions it will not be found necessary to ever replace these graphite electrodes. Five pounds of resistor material is furnished with the furnace—about three pounds are required for the first charge, which is gradually replaced as it is used up.



Sectional illustration of **"High-Temp"** Furnace, showing internal construction.

Replacements: All refractory parts "A", "B", "C", "D", "J" and "K" (which may be destroyed through excessive heats or through numerous successive heats under normal conditions) are readily replaceable by the operator.

Equipment: The complete equipment consists of Furnace and Panel Switchboard with 7 feet of Asbestos covered Flexible Leads connecting furnace to switchboard panel. Panel comprises Voltmeter, Ammeter, Circuit Breaker, Main Line Switch and Rheostat. The Rheostat, which is mounted on back of the panel board, has a front handle control which projects through the panel at the center. The handle of the Rheostat is marked with plate showing direction for securing "Heat-Increase" and "Heat-Decrease." The Crucible is extra.

Operation and Maintenance of Temperature: An instruction card which accompanies each furnace gives complete instructions for assembly and operation. The current consumption is controlled by the rheostat; therefore, by maintaining the known wattage for temperature desired, that temperature can be maintained approximately constant within reasonable limits. For convenience, a conversion table is furnished by which the readings in Volts and Amperes are readily converted into Watts.

3379. **FURNACE—"High-Temp" Electric** for **110 to 125 Volts D. C.** on legs for vertical use only **210.00**

3379/1. **Ditto**—on Tilting Stand for operating in any position from vertical to within 30° from horizontal **220.00**

3381. **FURNACE—"High-Temp" Electric** for **110 to 125 Volts, A. C.** on legs for vertical use only **225.00**

3381/1. **Ditto**—on Tilting Stand **235.00**

Where 110 volts is not available write for special prices on 220 volt equipment.

3383. **Granular "High-Temp" Resistor Material** .....**per 5 lbs.** **1.50**

3385. **Special Crucible No. 88-H,** capacity 60 cc. **1.25**

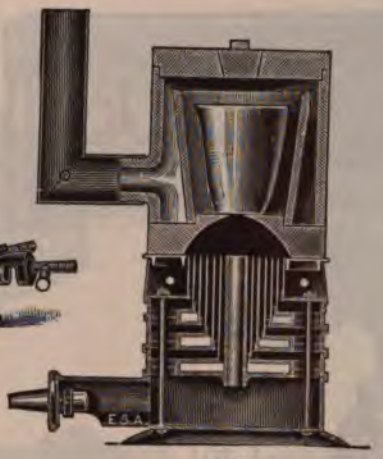
Replacements:

Type No.	88-A Receptacle	.....each	3.00	Type No.	88-K Cover Plug	.....each	.30
" "	88-B Pedestal	..... "	2.50	" "	88-L Top Electrode	..... "	6.50
" "	88-C Cylinder	..... "	4.50	" "	88-M Bottom Head	..... "	4.00
" "	88-D Cover Ring	.... "	1.50	" "	88-T Bottom Electrode	.. "	2.50
" "	88-F Top Segment	... "	4.00	" "	88-U Top Head	..... "	3.50
" "	88-G Bottom Segment	"	4.00	" "	88-W Top Bus-Bar	..... "	3.00
" "	88-J Cover	..... "	3.50	" "	88-X Bottom Bus-Bar	... "	2.00

Nickel contact plate with stand, under bottom electrode T (making connection to X) .....**each** **4.50**

No. 88-H is not furnished with the complete equipment—furnished only as an extra.

3404



3408

3410

3422

Furnaces for Coal Gas

See also Braun Furnaces, Nos. 3434–3442.

3402. **FURNACE—Crucible, Fletcher,** with improved gas burner; noiseless in action, works with a very small gas supply. Gas supply required ⅜ inch pipe. Complete with one No. 00 clay crucible, without blower **6.00**

No. 9a Foot Blower is recommended for use with this furnace. See No. 762.

3404. **FURNACE—Crucible, Fetcher Injector.** This is a very simple and satisfactory type. The burner is in one casting and does not readily become overheated.

No.	41	41a
Crucible, space, inches	3½x3½	5½x4¾
Price, with one crucible and burner	**8.00**	**10.00**

No. 9b Foot Blower is recommended for use with this furnace. See No. 762.

3406. **FURNACE—Crucible, Fletcher,** accommodates crucibles up to 4x3½ inches, holding about 6 pounds when full. With a ½ inch gas pipe, supplying about 50 feet per hour, it will rapidly melt a crucible of gold or silver. Complete with 6 ft. pipe, crucible and tongs **30.00**

3408. **Ditto**—with burner **50.00**

3410. **FURNACE—Combination, Fletcher,** accommodates crucible No. 3 or No. 6 and muffle 3½x2¾x6½ inches. Price complete with No. 3 crucible, muffle and burner... **19.00**

No. 9b Foot Blower is recommended for use with this furnace. The gas supply must be from a ½ inch pipe, preferably ¾ inch.

3422. **FURNACE—Muffle, Fletcher,** for assaying and for all purposes up to 1000° C., where exact temperatures are required. May be operated by artificial, natural or gasoline gas without alteration.

Size No.	3	4	5	6
Inside muffle space, inches	3x4x2⅜	3⅞x5⅞x3	4⅞x6⅝x4	6x8½x4⅞
Requires Gas pipe and tap; bore, inches	½	¾	1	1
*Price complete	**30.00**	**36.00**	**55.00**	**65.00**
Extra Plumbago muffles	**2.75**	**3.50**	**4.25**	**5.00**
Extra Domes	**2.75**	**3.50**	**4.25**	**5.00**

* Muffle Dome, crucible tongs and 6 ft. of chimney pipe are included in these prices.

3423/1

3424

3428

3423. **FURNACE—Blast, Parr,** for Coal Analysis. The burners of this furnace are especially adapted to the determination of ash and volatile matter. With bank of four burners **27.50**

3423/1. **Ditto**—With bank of six burners **37.50**

3424. **FURNACE—Muffle, Wiesnegg,** for ash determinations, etc. This furnace burns about 20 cu. ft. gas per hour, and will produce temperatures up to about 800° C. Accommodates muffle, 7 3/16 inches long, 4¾ inches wide and 2⅛ inches high; complete with burners and one muffle **25.50**

Extra muffles **1.00**

3426. **Ditto**—equipped with Meker burners, producing temperatures up to 1000° C. Muffle 6¾ inches long, 4½ inches wide, 2¾ inches high; complete with set of 4 burners and one muffle **40.00**

3428. **FURNACE—The Monitor.**

In this furnace the flame arises from the burner, and passes horizontally through the body of the furnace to the chimney. Its form and mode of operation are somewhat similar to that of a reverberatory furnace, the movable bricks, when in place, forming the roof. The exterior dimensions are 20 inches long, 7 inches wide, and 5½ inches deep. It will accommodate four 2¾ inch scorifiers or eight to ten cupels at once. The cavity is 3⅝ inches deep, accommodating a No. 1 Plumbago crucible.

Price includes one length of chimney pipe, with damper, crucible, and tongs **37.0**

3434

3438

Furnaces for Gasoline

These furnaces can also be used with gas, using Braun gas burner No. 1538.

3434. **FURNACE—Crucible, Braun Improved, No 8,** capacity 6 F crucibles or equivalent. In this furnace the 2 crucibles nearest the outlet deflect the flame, enabling it to better perform the work before passing out of the furnace **28.00**

1½ inch Cary Burner recommended, No. 1446.

3438. **FURNACE—Muffle, Cary,** fitted with patent draught inducing attachment, etc. Special combustion chambers around the muffle distribute the heat and produce a uniform temperature in all portions of the muffle. This furnace, size No. 33a, operated by The Braun Gas Burner No. 1538, as used by The Bureau of Mines and others, for ash determinations of coal. The furnaces are supplied complete with muffle door, hood with special draught attachment, and 2 lengths stovepipe.

No.	20	33a
Size of muffle, inches	6x12x4	8x12x5¼
Cary burner recommended inches	1½	2
Price, complete	**29.00**	**45.00**
Extra muffles	**1.80**	**2.30**

3440

3340. **FURNACE—Combination, Cary, No. 30.** These furnaces are provided with large combustion chamber around the muffle, producing a uniform temperature in all parts of the muffle. With each furnace is included a muffle, hood and draft attachment, stovepipe and covers. Size of muffle 6x9x4 inches, capacity 4 F crucibles, 2 inch Cary burner is recommended for use with this furnace **38.00**

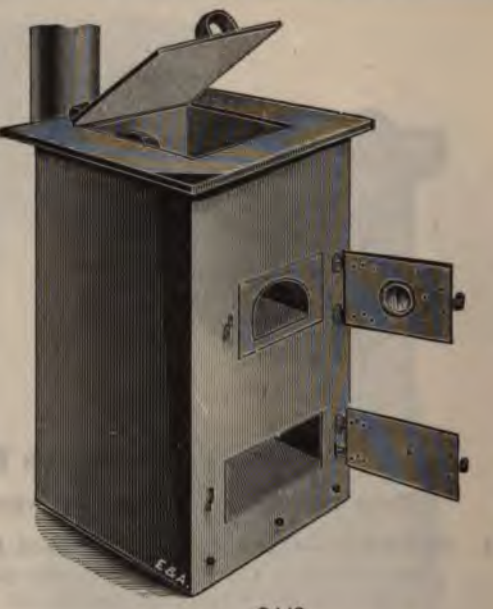
Extra muffles **1.45**

3442. **FURNACE –Combination, Braun.** These furnaces are constructed in such a manner that the muffle is placed above the crucible compartment. The burner hole opening is so located that the flame is forced in rotary motion around both sides of the crucible compartment. The heat rising from the crucible chamber creates by suction a draught through the full length of the muffle, and secures rapid cupellation. *Temperature in muffle, obtainable with Braun Gas burner,* 1280° *C., with Cary hydrocarbon burner,* 1150° *C.* With each furnace is included one muffle, hood, 2 lengths of stovepipe, and covers.

For cut, see next page.

No.	42	40
Size of Muffle, inches	4¾x8x3	6x10x4
Crucible capacity, inches	6F or 4G	10F or 6G
Cary burner recommended, inches	1½	2
Price	**28.00**	**44.00**
Extra Muffles	**1.25**	**1.45**

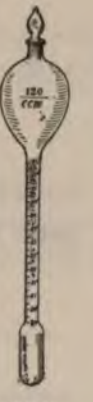
3442



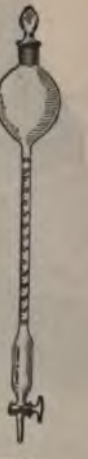
3443

3443. **FURNACE—Brown, Assay Furnace for Coal or Coke,** of heavy sheet iron, with fire-brick lining. Can be used for both muffle and crucible operations. Accommodates muffle 12x6x4 inches. Weight packed for shipment 200 pounds **65.00**

3444



3458



3460

Tank Outfits for Use with Furnaces for Gasoline

3444. **TANK OUTFIT**—For use with Cary burners; made of heavy tinned iron; each tank and fittings thoroughly tested. The outfit is furnished with a strong pump, pressure gauge, 12 ft. ¼ in. pipe, two swivel joints, necessary valve and fittings.

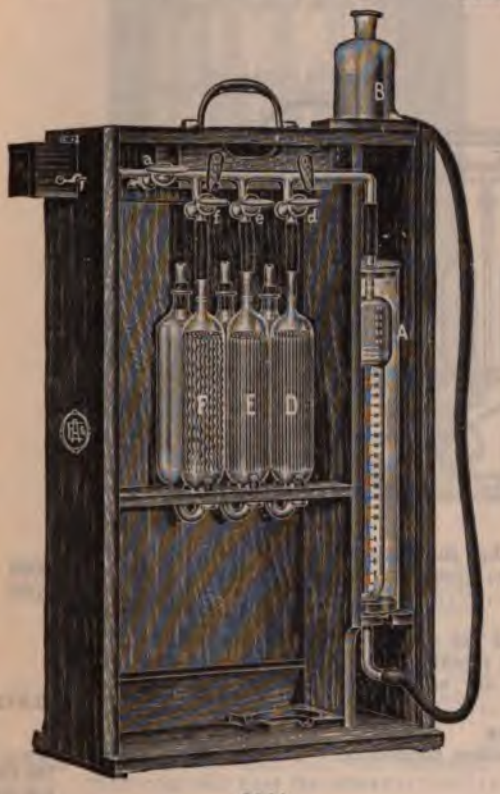
Capacity, gallons	2	7	10
Each	**32.00**	**38.00**	**41.50**

3458. **FUSEL OIL DETERMINATION APPARATUS—Rose-Herzfeld,** for 20 cc. chloroform and 100 cc. alcohol; graduated in 1/20th cc. **3.50**

3460. **Ditto—Bromwell** (Bureau of Chemistry Bulletin No. 107, revised) with stopcock and glass stopper **5.50**

Gas Analysis Apparatus

For detailed description of gas analysis apparatus see Hempel's "Methods of Gas Analysis" and other text books



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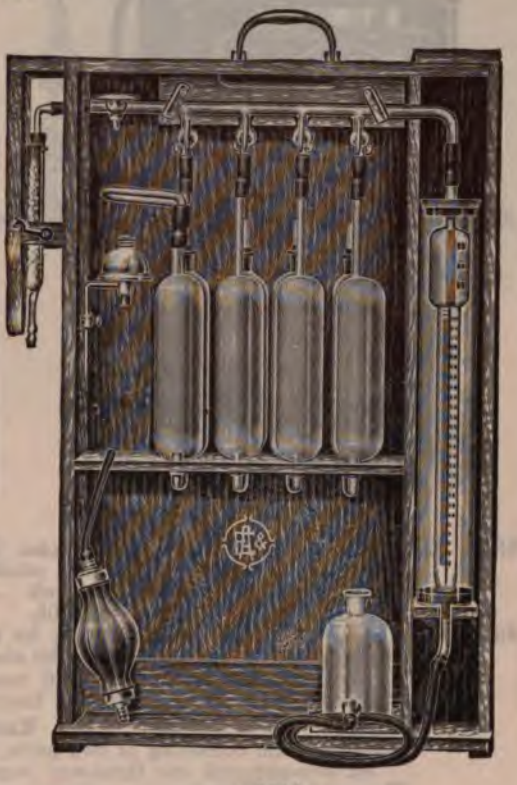


3504

500. **GAS APPARATUS—Orsat-Muencke,** for determining CO_2, CO, and O, especially in flue and furnace gases; consisting of three absorption pipettes, tube with four stopcocks, measuring burette with water jacket, and aspirator bottle; complete in portable wooden case **40.00**

00a. **Set** of three necessary reagents in 500 cc. glass stoppered bottles **3.00**

Extra Parts for 3500

Tube with four stopcocks		**11.50**
Absorption Pipettes, plain,	each	**1.65**
Absorption Pipettes, filled with glass tubes	each	**2.00**
Absorption Pipette, filled with glass tubes and copper wire		**2.50**
Measuring Burette with water jacket		**5.50**
Water jacket only, for measuring burette		**1.20**
Aspirator Bottle		**.90**
Drying Tube, filled with glass wool		**.60**
Soft rubber Bags for attaching to Pipettes (1282)	each	**.70**

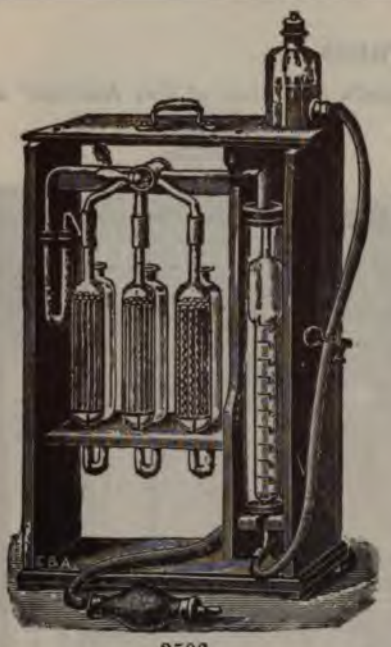
02. **GAS APPARATUS—Fischer,** same as above, but half the size; very convenient for traveling, complete in wooden case **38.50**

Extra parts, prices same as under No. 3500.

504. **GAS APPARATUS—Orsat-Lunge,** similar to No. 3500, but with four pipettes, and arrangement for estimating Hydrogen separately; complete in portable wooden case. **50.00**

Extra Tube with five stopcocks	**13.00**
Extra pipette g for Hydrogen with glass tubes	**2.00**
Extra lamp	**1.25**

Extra rubber bulb, double acting, see No. 1286.
Other extra parts same as under No. 3500.



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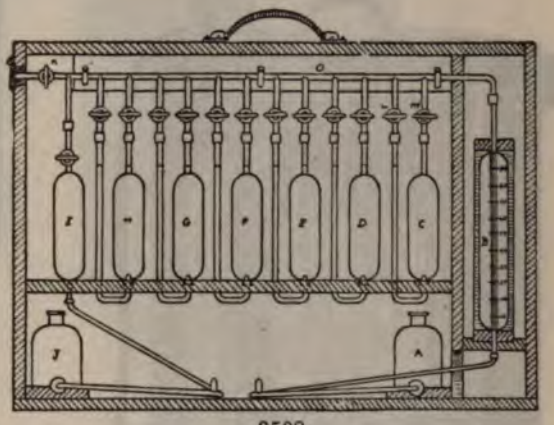


3508

3506. **GAS APPARATUS—Orsat-Muencke, Petrizilka modification,** with large universal stopcock dispensing with four smaller ones; complete in portable wooden case .. **45.00**

Extra Tube with Universal Stopcock **15.00**

Other parts, same as No. 3500.

3508. **GAS APPARATUS—Orsat-Tuttle,** for technical gas analysis. With this apparatus, the gas passes in bubbles through the absorption pipettes from the bottom, insuring complete absorption. Complete in case with six absorption pipettes, one explosion pipette, and 100 cc. graduated burette **100.00**

Extra Parts

Stopcock beam consisting of two parts, with rubber connection. The left hand having six two-way and one three-way stopcock **18.00**

The right hand having six two-way stopcocks **14.00**

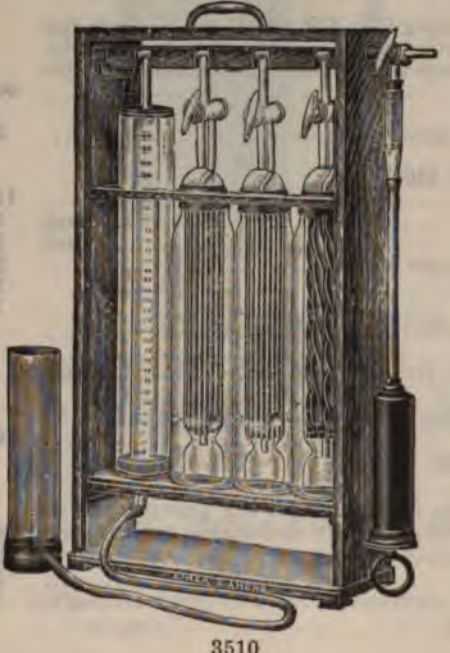
Absorption Pipettes, plain (6 pcs.) each **1.80**

Explosion Pipette I..... **5.00**

Measuring Burette with water jacket **5.50**

Aspirator Bottles .....each **1.40**

Soft rubber bulbs (7 pcs.) (No. 1282) .....each **.70**



3510

3510. **GAS APPARATUS—Williams Improved,** for flue and furnace gas analysis; fitted with Williams special bubbling pipettes, which greatly reduce the time for absorption of the various constituents of the gas. Complete in portable case **50.00**

Extra Parts

Manifold, consisting of 3 capillary T-tubes, connected by rubber.. **2.50**

Bubbling Pipettes with stopcock, filled with glass tubes....each **8.00**

Bubbling Pipette with stopcock, filled with copper strips..... **10.00**

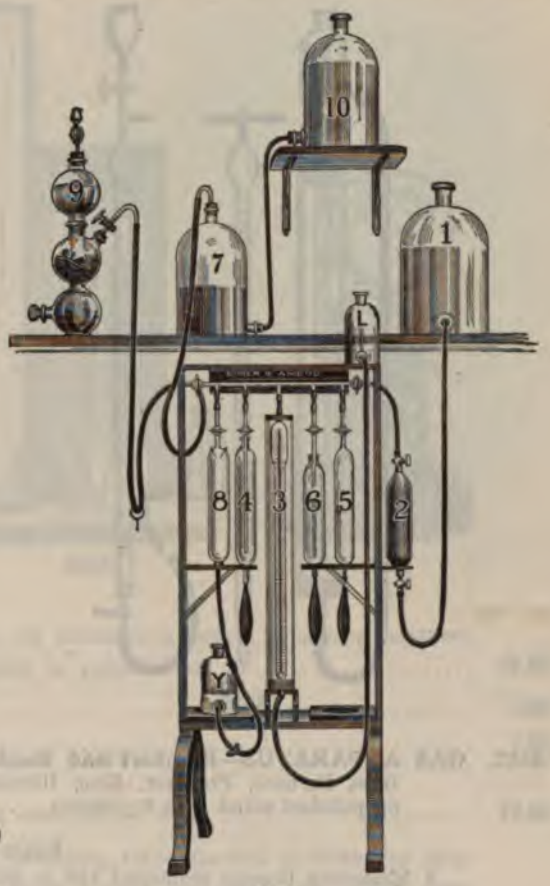
Measuring Burette with water jacket, graduated 100 cc. in 1/5th cc. **8.50**

3-way stopcock (on outside of box) **3.50**

Leveling cylinder (bottle) with brass clamp **2.00**

Hard rubber syringe **1.50**

3512



3516

3512. GAS APPARATUS—Williams, for the complete analysis of combustible gases. The compactness, portability, accuracy, and ease of cleaning make this a very desirable apparatus. Complete with explosion pipette, etc., in oak case **65.00**

3514. Portable explosion coil with batteries, in oak case for above **10.00**

Extra Parts for No. 3512

Manifold, consisting of 4 capillary T-tubes, connected by rubber **3.25**
Measuring Burette with water jacket, graduated 100 cc. in 1/5 cc. with stopcock and platinum electrodes **11.50**

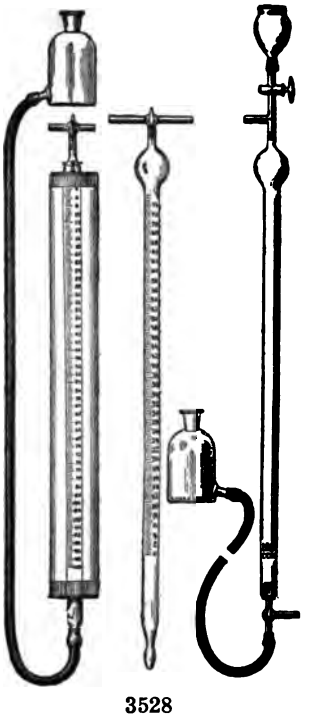
Other parts same as under No. 3510.

3516. GAS APPARATUS—United States Steel Corporation Official Apparatus, for the technical analysis of gases. The apparatus shown in the above cut has been designed with particular reference to its adaptation to the methods as described in Pamphlet of the United States Steel Corporation for the Technical Sampling and Analysis of Gases, second edition **90.00**

The distinguishing features in its design are the capillary tube of 1 mm. bore, the accessibility of the auxiliary gases, and the central location of the burette, thus decreasing the error due to the capillary space.

Extra Parts

Beam with 2 3-way stopcocks and 5 outlets **12.00**
Explosion Pipette No. 8 ..... **6.50**
Liquid Reagent Pipette No. 4 for Potassium hydroxide solution **7.00**
Solid Reagent Pipette No. 6 for stick phosphorus **5.00**
Liquid Reagent Pipette No. 5 for fuming sulfuric acid **7.00**
Burette with water jacket, graduated 100 cc. in 1/10 cc., No. 3 ..... **10.50**
Gas sampling tube of heavy copper (No. 3614), No. 2 ..... **6.50**
Kipps Generator, pint size, No. 9 ..... **10.00**
Aspirator Bottle, 1 gallon size, No. 10 ..... **3.20**
Aspirator Bottles, ½ gallon size, Nos. 7 and 1 ..... **2.00**
Aspirator Bottles, 8 oz. size, Nos. L and Y ..... **.60**
Soft rubber Bulbs (No. 1282) ..... each **.70**
Pamphlet of the U. S. Steel Corporation for the Technical Sampling and Analysis of Gases **1.50**



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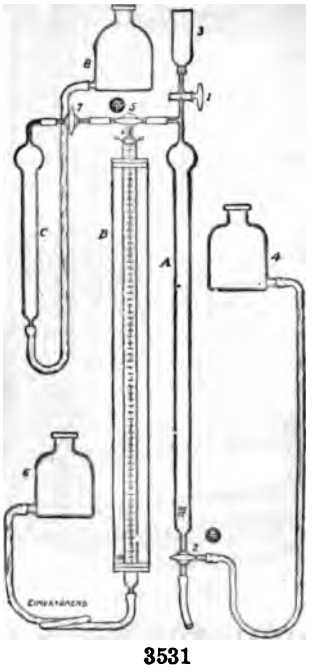

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3517. **GAS APPARATUS—Barnhart and Randall,** for the rapid and accurate analysis of Blast Furnace, Producer, Flue, Illuminating, and Fuel Gases; apparatus complete on polished stand with 8 pipettes **120.00**

Extra Parts

1 Measuring Burette graduated 102 to 50 cc. in 1/10 cc. with water jacket	**15.00**
5 Liquid Reagent Pipettes ..... each	**6.00**
1 Explosion Pipette	**8.50**
1 Solid Reagent Pipette	**3.50**
1 Hydrogen Pipette	**5.00**
4 Seal Tubes ..... each	**3.00**
7 Erlenmeyer flasks 250 cc. ..... each	**.22**
1 Capillary Stopcock	**2.75**

3528. **GAS APPARATUS—Elliott,** three-way stopcock for drawing in gases; complete with explosion burette as illustrated **29.00**

Extra Parts

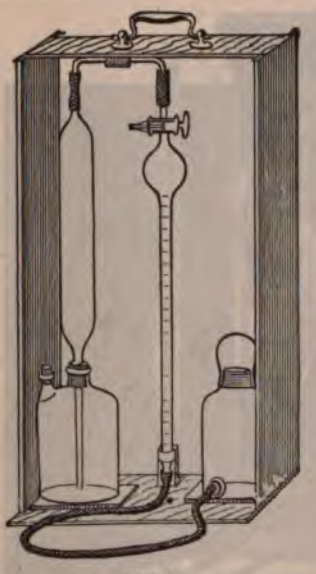
Explosion Burette with water jacket	**13.00**
Water Jacket only	**2.00**
Measuring Burette	**5.50**
Absorption Burette	**9.00**
Aspirator Bottles, 8 oz. capacity ..... each	**.95**

3530. **Ditto**—small: half the regular size **27.50**

3531. **GAS APPARATUS—Elliott-Uhlig.** In this modification the explosion tube is retained and is used for all the measurements. In addition, there is placed to the left of the apparatus a plain bulbed tube to hold the residual gas and furnish a supply of the same where the explosion is to be repeated **27.50**

Separate Parts

Laboratory Tube	**9.00**
Explosion Tube with water jacket	**13.00**
Residual Gas Tube (not graduated)	**3.00**



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3534. **GAS APPARATUS—Lindemann-Winkler,** for determining oxygen in gaseous mixtures, using phosphorus as absorbent; complete in portable case **25.00**

Extra Graduated burette with stopcock **5.50**

Extra Phosphorus Tube **1.00**

3536. **GAS APPARATUS—For testing oxygen,** complete on stand **22.50**

The apparatus consists of a 100 cc. measuring tube attached to three-way stopcock, the lower and narrower portion being divided into tenths of a cubic centimeter. A tube open below contains a roll of copper gauze suspended in a jar filled with the absorbing liquid. The three-way stopcock on bent tube serves to connect the tube with copper gauze with the measuring vessel. The graduated tube is also connected at foot by means of an india rubber tube with a glass bulb, the raising or lowering of which drives the gas in and out of the measuring and absorption tubes.

Separate Parts

Oxygen Burette **3.50**

Three-way Stopcock **3.50**

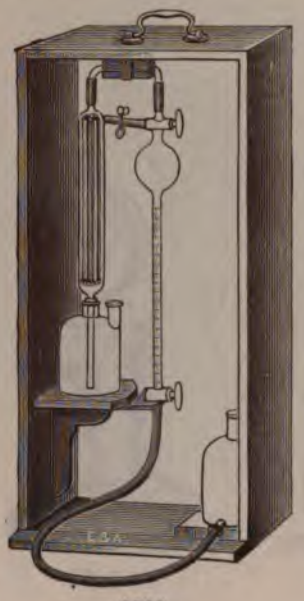
Copper Container **1.00**

Pipette **3.00**

Jar ..... **.90**

3537. **GAS APPARATUS—Dwight CO_2 Indicator,** for rapidly determining the percentage of CO_2 in flue gases, consisting of a cast-metal tank with accurately calibrated indicating gauge, in ¼% divisions. Reservoir in base holds solution for 300 tests. "Pump sample into tank, close top and bottom cocks, shake once or twice and read percentage of CO_2 on gauge. Time required one minute." Complete as illustrated with rubber tubing, bulb and charge of chemicals **40.00**

3537a. **Carrying case** for above **5.00**



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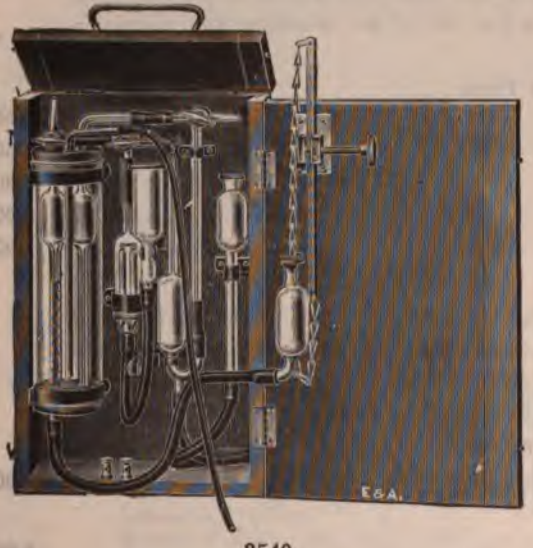
3538. **GAS APPARATUS—Winkler,** for determining carbon dioxide in gases containing relatively small quantities; complete in portable case **25.00**

Extra Graduated burette with stopcocks **6.00**

3539. **GAS APPARATUS—Haldane, for the analysis of mine gases.** Complete in portable wooden case **62.50**

The outfit consists of a burette graduated in 1/100th cc., a potash absorption pipette for CO_2, a combustion pipette for the slow burning of methane, by means of a platinum wire, requiring 4 amps. from an ordinary lighting circuit. Attached to the burette and pipettes is a compensating tube, which corrects temperature and pressure changes during analysis. With this apparatus it is possible to determine CO_2 and methane within 1/100 of 1%.



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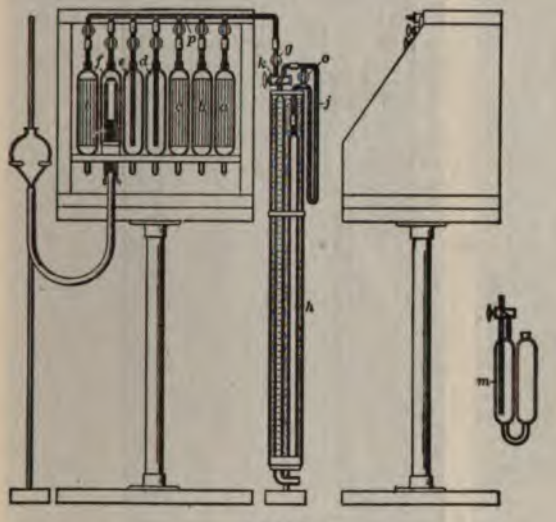
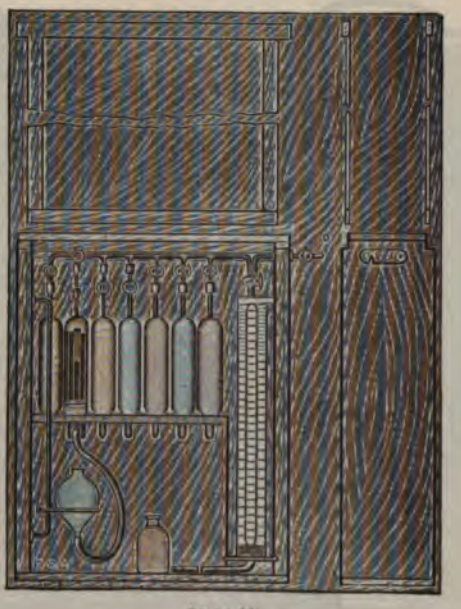
3540. **GAS APPARATUS—Haldane,** portable; for the analysis of small quantities of CO_2 in air; in wooden case.... **50.0**



3541/1



3541/2

Burrell Gas Analysis Apparatus

For additional details, see Bureau of Mines Bulletin No. 42, also Jour. Ind. and Eng. Chem., April, 1912

3541/1. GAS APPARATUS—Laboratory type, for mixtures containing CO_2, O_2, C_2H_4, CO, H_2, CH_4, and N_2, with 7 pipettes, and 1 water jacketed burette with 3-way stopcocks. Complete on 3 supports **125.00**

This particular apparatus is useful for a large class of analysis and very precise work can be performed with it. The burette has a capacity of 100 cc. and is graduated in 1/10 cc. Readings can be made to 0.05 cc. The compensating attachment is similar to Hempel's adaption of Peterson's principle and is attached to the burette. Mercury is used both in the burette, combustion pipette, and manometer tube.

Extra Parts

Stopcock beam with 3 2-way and 1 3-way stopcocks **14.00**
Pipette "a," for caustic potash solution for absorbing carbon dioxide; **with glass tubes** **2.50**
Pipette "b," for fuming sulfuric acid for absorbing unsaturated hydrocarbons; **with glass tubes** **2.50**
Pipette "c," for alkaline pyrogallate solution for absorbing oxygen; **with glass tubes** **2.50**
Pipettes "d" and "e," for absorbing carbon monoxide by means of cuprous chloride solution ..... **each** **7.50**
Pipette "f," for slow-combustion **7.50**
Pipette "i," for alkaline pyrogallate solution; **with glass tubes** **2.50**
Water jacketed burette with 2 3-way stopcocks, compensating and manometer tube with common stopcock **25.00**

3541/2. GAS APPARATUS—portable type, for mixtures containing CO_2, O_2, C_2H_4, CO, H_2, CH_4, and N_2. Capacity of burette 100 cc. graduated in 0.2 cc. Complete in carrying case **140.00**

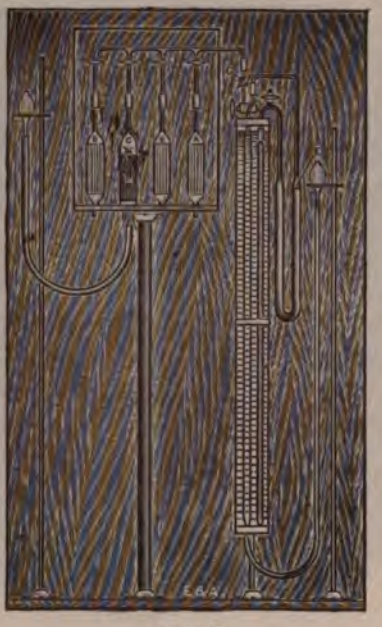
This form is similar to above, but portable instead of laboratory type.

Water is used both in the burette and slow-combustion pipette. Some accuracy is, of course, sacrificed by the use of water, but the apparatus is built for technical purposes, with the idea of utilizing the slow-combustion pipette for burning methane and hydrogen and the Babb (d&e) pipettes for the carbon monoxide determination. If desired, an explosion pipette can be furnished instead.

Extra Parts

Stopcock Beam with 4 2-way and 1 3-way stopcock **16.00**
Pipette for slow combustion **6.50**
Water jacketed Burette, graduated 100 cc. in 1/5 ..... **16.00**
Three-way Stopcock **3.50**

All other parts same as No. 3541/1.



3541/3

3541/4

3541/3. **GAS APPARATUS—Laboratory type,** for natural gas analysis, with 3 absorption and 1 slow-combustion pipette, and water jacketed burette with 3-way stopcocks, on 4 supports **90.00**

Mercury is used in the burette and the slow-combustion pipette.

Extra Parts

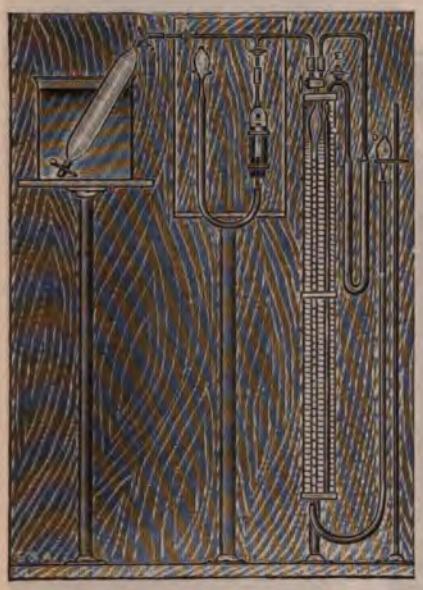
Stopcock Beam with 4 2-way stopcocks **10.00**
Pipette "a," for removing carbon dioxide; **with glass tubes** **2.50**
Pipette "b," for removing oxygen; **with glass tubes** **2.50**
Pipette "c," for slow combustion **6.50**
Pipette "d," for nitrogen; **with glass tubes** **2.50**
Water jacketed burette with 2 3-way stopcocks, compensating and manometer tube with common stopcock **27.50**

3541/4. **GAS APPARATUS—Laboratory type,** for the exact analysis of mine gases, with 2 absorption and 1 slow-cumbustion pipette, complete on 3 supports **82.50**

Mercury is used both in the burette and the slow-combustion pipette. The apparatus can also be used satisfactorily for an accurate analysis of the constituents in flue gases.

Extra Parts

Stopcock Beam with 3 2-way stopcocks **7.50**
Pipette "a," for caustic potash solution for the removal of carbon dioxide; **with glass tubes** **2.75**
Pipette "b," for slow combustion **6.50**
Pipette "c," for alkaline pyrogallate solution for the removal of oxygen; **with glass tubes** **2.50**
3-way stopcock which connects with compensating tube **3.25**
Burette with 3-way stopcock, water jacket and compensating tube **20.00**



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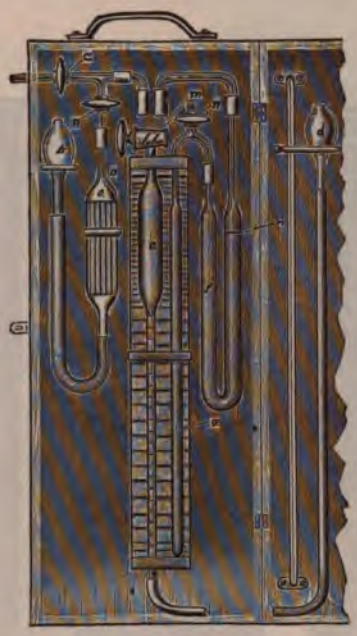

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3541/7

3541/5. **GAS APPARATUS—Laboratory type,** for the exact determination of methane in mine air. Complete with water jacketed graduated measuring burette, with 3-way stopcock, compensating tube and manometer tube with stopcock, stopcock beam with 2 stopcocks, and slow-combustion pipette, on 4 supports **70.00**

Methane is the combustible gas commonly found in gas mines. Paraffin hydrocarbons higher than methane may be occasionally present, but if so, usually only in traces. Mercury is used both in the burette and slow-combustion pipette, and water is used in the manometer tube. A determination can be made in less than 10 minutes with an accuracy of 0.01%.

Extra Parts

Stopcock beam with 1 3-way and 1 2-way stopcock **5.50**
Pipette for slow combustion **6.50**
Water jacketed burette with 3-way stopcock, compensating and manometer tube with stopcock. Capacity of burette 21 cc., capacity of bulb 15 cc., capacity of stem 6 cc., stem graduated in 1/100 cc. **22.50**

3541/6. **GAS APPARATUS—portable type,** for the exact determination of methane, complete in carrying case **85.00**

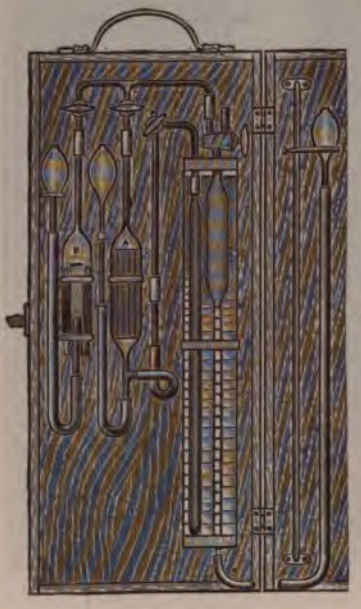
The portable type is similar in construction to the above.

3541/7. **GAS APPARATUS—portable type,** for the determination of methane in mine air, complete in carrying case **75.00**

This is a simple form of gas analysis apparatus and was devised for the purpose of making a quick determination of methane, for use by mining men who are not chemists. Water is used both in the burette and in the slow-combustion pipette, in which the determination is made with an accuracy of 0.1 per cent.

Extra Parts

Stopcock beam with 1 3-way and 1 2-way stopcock **5.50**
Pipette for slow combustion **6.50**
Burette with water jacket, capacity 100 cc., capacity of bulb 80 cc., capacity of stem 20 cc., stem graduated in 1/20 cc. **9.00**



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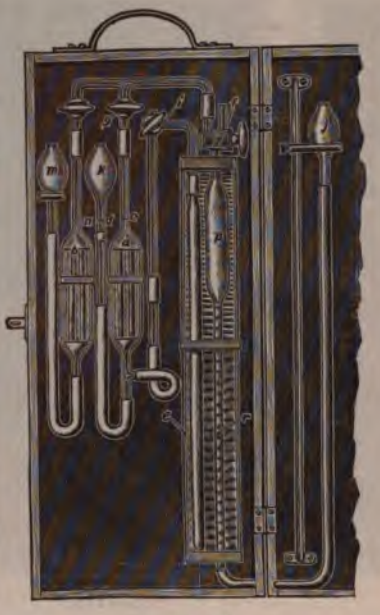

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3541/10

3541/8. **GAS APPARATUS—portable type,** for the accurate determination of carbon dioxide and methane in mine air. Complete in carrying case **85.00**

This apparatus is a modification of that shown under No. 3541/4. Mercury is used both in the burette and slow-combustion pipette.

Extra Parts

Stopcock beam with 2 2-way stopcocks **3.50**
Pipette "a," for caustic potash solution; **with glass tubes** **2.75**
Pipette "c," for slow combustion **6.50**
Burette with 1 3-way stopcock with water jacket, capacity 20 cc., capacity of bulb of burette 17 cc., capacity of stem 3 cc., stem graduated in 1/100 cc. **15.00**
3-way stopcock which connects with compensating tube **3.25**

3541/9. **GAS APPARATUS—portable type,** for the exact determination of carbon dioxide and oxygen, complete in carrying case **82.50**

The apparatus is generally used for determinations of the air in public buildings, meeting houses, school houses, etc. Mercury is used in the burette.

Extra Parts

Stopcock beam with 2 2-way stopcocks **3.50**
Pipette "a," for caustic potash solution; **with glass tubes** **2.75**
Pipette "b," for alkaline pyrogallate solution; **with glass tubes** **2.50**
Burette with 1 3-way stopcock, with water jacket, capacity 15 cc., capacity of bulb 11.5 cc., capacity of stem 3.5 cc., stem graduated in 1/100 cc. **16.50**
3-way stopcock which connects with compensating tube **3.25**

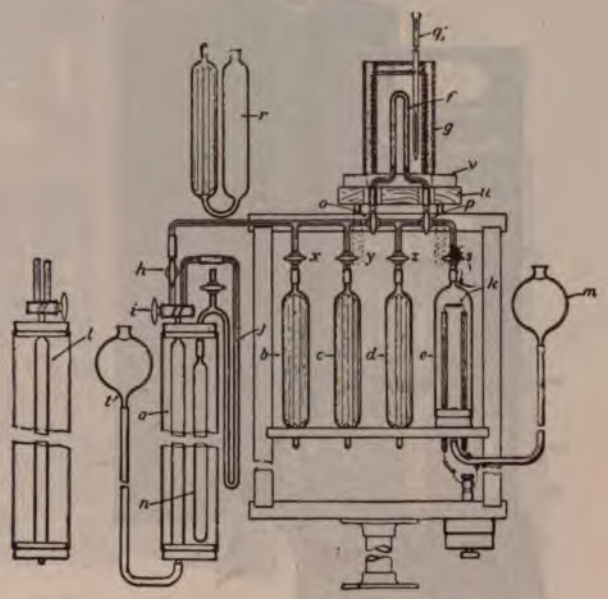
3541/10. **GAS APPARATUS—portable type,** for the exact determination of carbon dioxide only, complete in carrying case **80.00**

Mercury is used in the burette, water is used in the manometer tube.

Extra Parts

Stopcock Beam with 1 3-way and 1 2-way stopcock **5.50**
Pipette "a," for caustic potash solution; **with glass tubes** **2.50**
Water jacketed burette with 3-way stopcock, compensating and manometer tube with stopcock. Capacity of burette 20 cc., capacity of bulb 17 cc., capacity of stem 3 cc., stem graduated in 1/100 cc. **25.00**

3541/11



3543

3541/11. **GAS APPARATUS—portable type,** modified Orsat, used in fighting mine fires and exploring mines after explosions. The apparatus is accurate to about 0.20% **90.00**

Extra Parts

Stopcock beam, with 4 2-way and 1 3-way stopcocks **15.00**
Pipette "a," for caustic potash; **with glass tubes** **2.50**
Pipette "b," for alkaline pyrogallate solution; **with glass tubes** **2.50**
Pipette "c," for cuprous chloride solution; **with glass tubes** and **copper wire** **3.00**
Pipette "d," for slow combustion **6.50**
Burette with water jacket 100 cc. graduated in 1/5 cc. **7.50**

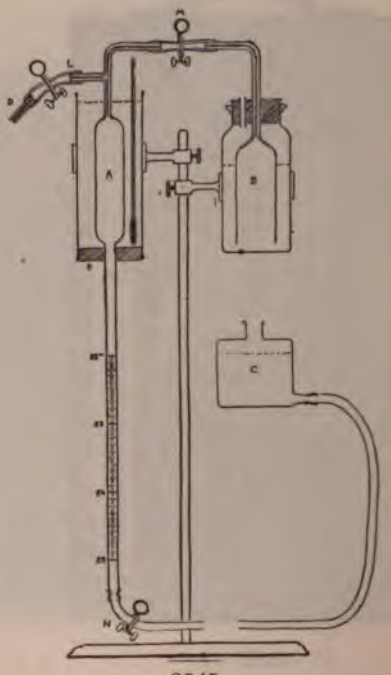
3543. **GAS APPARATUS—Burrell-Oberfell, Laboratory type,** with copper oxide tube for the determination of hydrogen and carbon monoxide in gas mixtures, complete on 3 stands **200.00**

The use of copper oxide instead of cuprous chloride solution for the carbon monoxide determinations has given great satisfaction. Copper oxide does not become poisoned as some palladium preparations at times do that are used for hydrogen determinations. On the other hand CuO lasts for practically an indefinite number of determinations, and is easily restored to activity when partly reduced by drawing air over it when hot. Mercury is used in the slow-combustion Pipette and in the Burette.

Extra Parts

Stopcock beam with 4 2-way and 2 3-way stopcocks **19.00**
Pipette "b," for caustic potash solution for the removal of carbon dioxide; **with glass tubes** **2.50**
Pipette "c," for fuming sulfuric acid for removing unsaturated hydrocarbons; **with glass tubes** **2.50**
Pipette "d," for alkaline pyrogallate solution for removing oxygen; **with glass tubes**. **2.50**
Pipette "e," for slow combustion **7.50**
Burette 100 cc. in 1/10 cc. with water jacket and 2 3-way stopcocks, with compensating tube and outside attachment, with stopcock for changes of temperature and pressure **25.00**
Copper oxide tube of quartz **27.50**
Electrically heated Oven, size about 7x3" with copper oxide tube **60.00**

3544

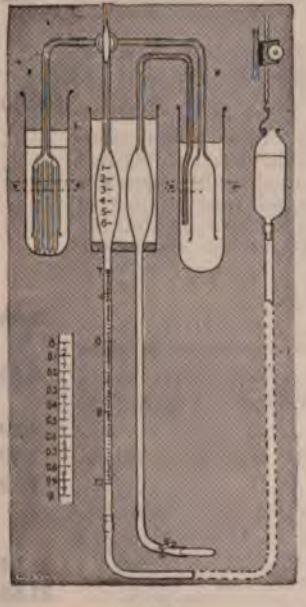


3545

Gas Apparatus for Sanitary and Physiological Tests

3544. **GAS APPARATUS—Petterson & Palmquist portable, modified by Rogers,** for the exact determination of CO_2 in air; graduated to indicate parts in 10,000 volumes air only; complete in portable case with instructions **85.00**

This apparatus has been adopted by many municipalities for factory and sanitary inspection.



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3545. **GAS APPARATUS**—for the determination of CO_2 in Alveolar Air and Blood, and the CO_2 combining power of Plasma and of whole blood, by Yandell Henderson and W. H. Morriss. Complete apparatus with thermometer mounted on support with leveling device **17.00**

3545a. **Glass parts** only without thermometer **11.00**

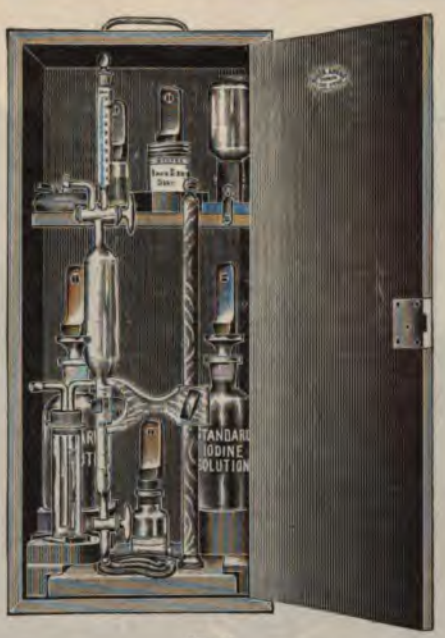
3545/1. **GAS APPARATUS—Haldane,** as modified by Yandell Henderson, with special four-way stopcock, mounted on support, with leveling device **45.00**

3545/1a. **Glass parts** only **33.00**

The advantage of above form of apparatus is not in its use during analysis, for this involves no significant change, but chiefly in the ease with which it can be taken apart and cleaned, and in the lessened liability to frozen cocks and breakage. It has a minimum of rubber connections and only **one** glass stopcock.

GAS APPARATUS—Van Slyke, for the determination of **Aliphatic Amino Groups,** see Nos. 7249–7249P.

3546



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3552

3546. **GAS APPARATUS—Ruedorff,** for determination of CO_2 or moisture **20.00**

3548. **GAS APPARATUS—Tutweiler,** for determination of sulfuretted hydrogen in illuminating and other gases. It is so constructed as to give readings in grains of sulfuretted hydrogen per 100 cu. ft. of gas, and as a determination can be made in three minutes, it affords a simple, rapid, and accurate method for determining the efficiency of a set of purifiers. Complete in portable case, with necessary chemicals and full directions.. **35.00**

3545a. Extra graduated burette **13.00**

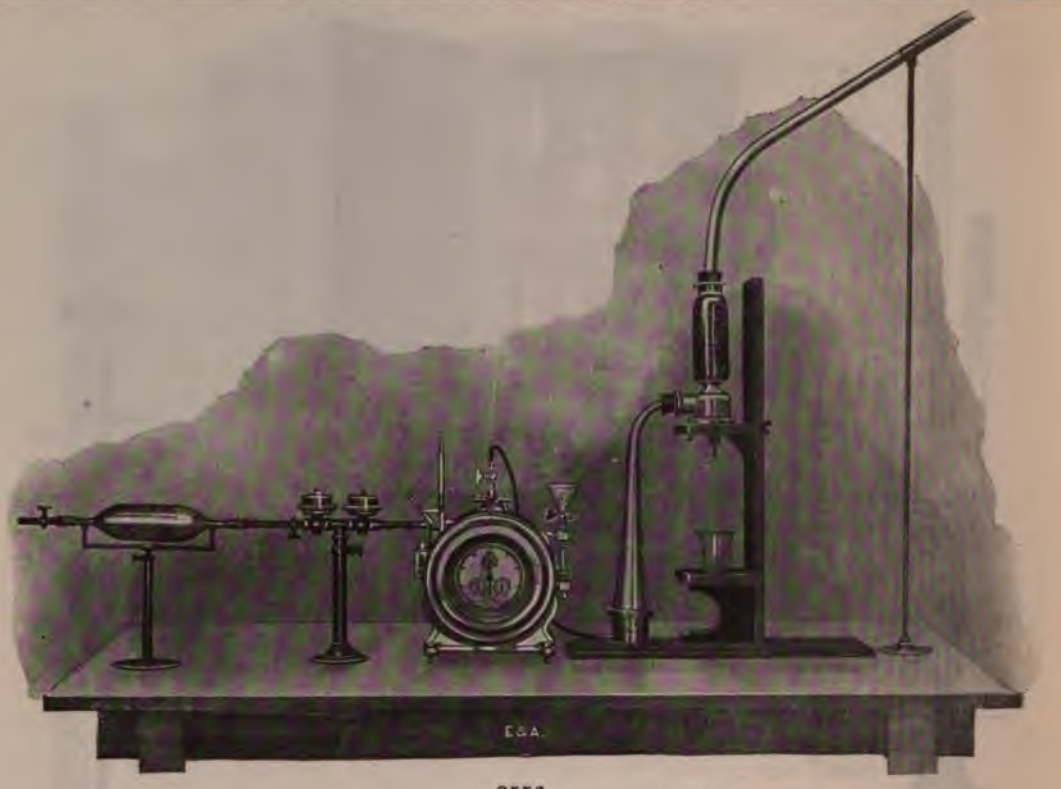
3550

3550. **GAS APPARATUS—Elliott, latest form, for determination of sulfur in illuminating and burning oils.** For burning oils, a light blown glass oil lamp is used, which can be readily tared on an analytical balance to weigh the amount of oil burned.

a. Glass parts, complete with oil lamp **15.00**
b. Iron stand, with clamps and rings **5.50**
c. Special Gas Burner as illustrated **12.00**

3552. **GAS APPARATUS—Graefe, for determination of sulfur in solid fuels, illuminating gases and burning oils.** Apparatus complete as illustrated, with gauze covering. **21.00**

The method employed is based upon the combustion of the material in an atmosphere of oxygen; absorption of the products of combustion by peroxide of sodium; and determination of the sulfur as $BaSO_4$. The gauze covering is for protection in case bottle should break. This, however, has never happened, although the method has been in daily use in different laboratories for years.



3556

3554. **GAS APPARATUS—Referees,** for determination of sulfur; complete with burner and support as illustrated below **30.00**

Extra Parts

Burner	**12.00**
Trumpet Tube	**4.00**
Calcium Chloride Jar	**4.50**

3554

3556. **GAS APPARATUS—For the quantitative determination of sulfur and ammonia in gas.** This apparatus consists of an ammonia saturator filled with glass beads, and provided with stopcocks and unions at each end, mounted on stand; an automatic shut-off meter, one double dry governor, mounted with vertical adjustment, for maintaining uniform pressure; and gas Referees sulfur apparatus, mounted as illustrated. Complete **232.00**

3556/1. **Ditto**—but with No. 3622—1/10 cu. ft. wet test meter instead of automatic shut-off meter **200.00**

Extra Parts

Ammonia Saturator on stand	**32.50**
Double dry governor	**20.00**
Automatic shut-off meter	**120.00**
Stand for straw tube	**8.50**

3557

3558

3557. **GAS APPARATUS—E. & A.,** for determination of sulfur and halogens in oil. The large bell jar insures rapid oxidation. For halogens silver nitrate solution is placed in both of the small absorbing bottles, two absorbing bottles being used to insure complete absorption. For sulfur, hydrogen peroxide or other oxidizing agent is added to $BaCl_2$ solution in both absorption bottles **12.00**

3558. **GAS APPARATUS—Drehschmidt,** for determining sulfur in illuminating gas; complete **40.00**

Extra Parts

Drehschmidt Burner	**16.00**
Calcium Chloride Jar	**3.00**
Gas Washing Bottles ..... each	**3.00**
Glass Cylinder C	**2.75**

3560. **Ditto—Reich,** for determination of SO_2 in lead chambers; complete on wooden support as illustrated **20.00**

3562. **Ditto—Cooper-Chollar,** for approximately determining constituents of illuminating gas.

Bulb part having % of total contents	50	75	90
Each	**3.25**	**3.25**	**3.25**

3560 3562 3564 3566

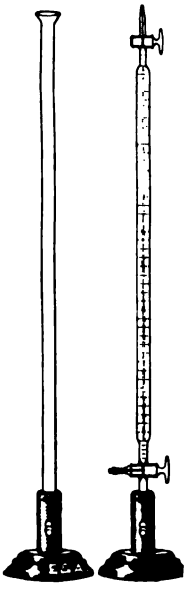
3564. **GAS BURETTE—Bunte,** with water jacket fitted with rubber stoppers.... **9.00**

3566. **GAS BURETTE—Hempel,** plain with leveling tube; complete with iron bases **6.00**

3567. **Ditto**—complete with wooden bases **7.00**

Extra Parts

Burette only	**3.50**
Leveling Tube only	**.80**
Iron bases only..each	**1.20**
Wooden bases only, each	**1.75**



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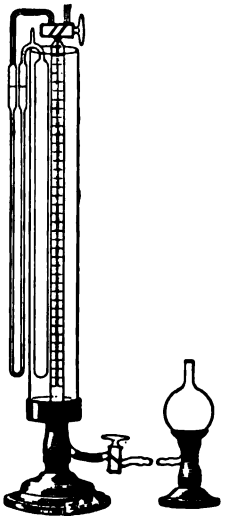

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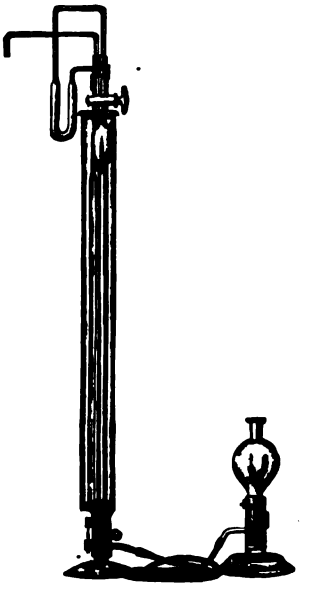

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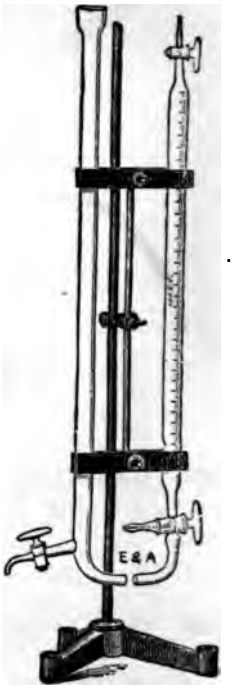

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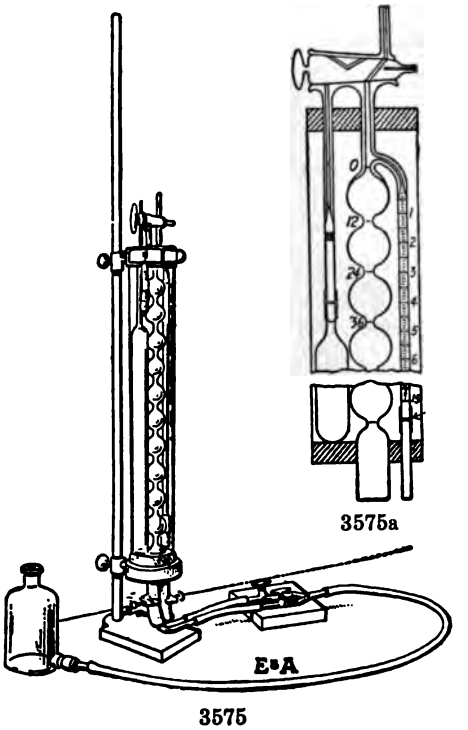
3568. **GAS BURETTE—Hempel,** with glass stopcocks, and leveling tube; complete with iron bases **11.75**

3569. **Ditto**—complete with wooden bases **13.30**



3575a

3575

Separate Parts

Burette only	**9.50**
Leveling tube only	**.80**
Iron Bases only .....each	**1.20**
Wooden base for burette	**2.20**
Wooden Base for leveling tube...	**1.75**

3570. **GAS BURETTE—Hempel,** with stopcocks and leveling bulb and with attachment for temperature and pressure correction; mounted as illustrated **16.50**

3570a. **Burette** only without water jacket .. **9.00**

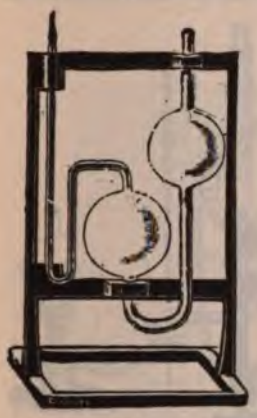
3572. **GAS BURETTE—Tutweiler,** with 4-way stopcock, manometer, correction tube and water jacket, leveling tubes and heavy bases **25.00**

3574. **GAS BURETTE—Winkler,** complete with support **18.50**

3574a. **Glass parts only** for above **13.50**

3575. **GAS BURETTE—Alfred H. White, for exact gas analysis,** mounted on stand with rubber tube, and leveling bottle as illustrated **38.50**

3575a. **GAS BURETTE** with jacket only.. **28.00**



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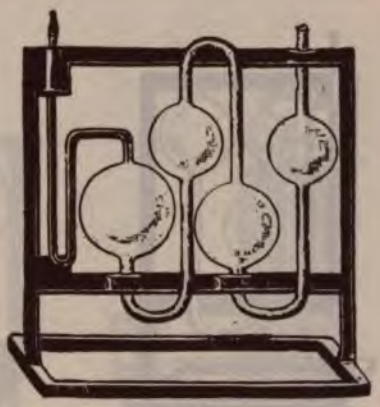


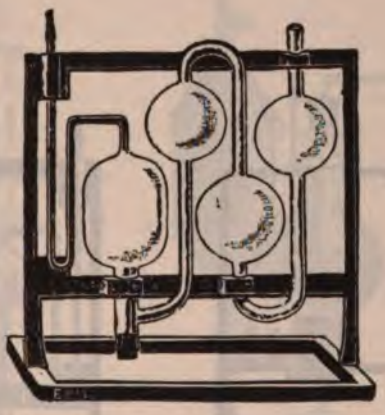
3580

HEMPEL PIPETTES

We recommend **Hempel gas pipettes** mounted in **iron frames**, as iron frames are steadier and more durable than wooden ones.

3576.	**GAS PIPETTE—Hempel, Single, for liquid reagents,** mounted on iron stand....	**4.00**
3577.	**Glass Parts** only for above	**1.25**
3578.	**GAS PIPETTE—Hempel, Single, for solid and liquid reagents,** mounted on iron stand	**5.50**
3579.	**Glass Parts** only for above	**1.60**
3580.	**GAS PIPETTE—Hempel, Double, for liquid reagents,** mounted on iron stand....	**6.30**
3581.	**Glass Parts** only for above	**2.25**

3581/1



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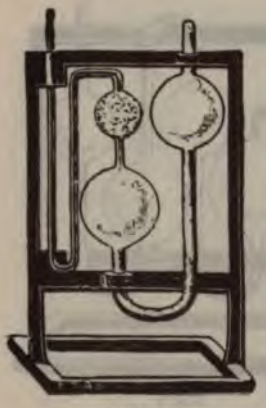
3581/1.	**GAS PIPETTE—Hempel as modified** by Prof. Jerome J. Morgan of Columbia University, designed for rapid and easy filling, mounted on iron stand	**6.50**
3581/2.	**Glass Parts** only for above	**2.50**
3582.	**GAS PIPETTE—Hempel, Double, for solid and liquid reagents,** mounted on iron stand	**6.50**
3583.	**Glass Parts** only for above	**2.50**
3584.	**GAS PIPETTE—United Gas Improvement Co. form, Double,** compact and easy to fill; mounted on iron stand	**19.50**
3585.	**Glass Parts** only for above	**12.50**



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3586. **GAS PIPETTE—Hempel, Single, for Ethylene,** with glass beads; mounted on iron stand **6.00**

3587. **Glass Parts** only for above **3.25**

3588. **GAS PIPETTE—Hempel, modified by Gill, for Ethylene,** mounted on iron stand.... **6.75**

3590. **GAS PIPETTE—Hempel, Explosion,** mounted on wooden stand **9.00**

3591. **Glass Parts** only for above **5.00**

3592. **GAS PIPETTE—Hempel, Explosion, with leveling bulb,** both mounted on iron supports **10.00**

3593. **Glass Parts** only for above **5.50**

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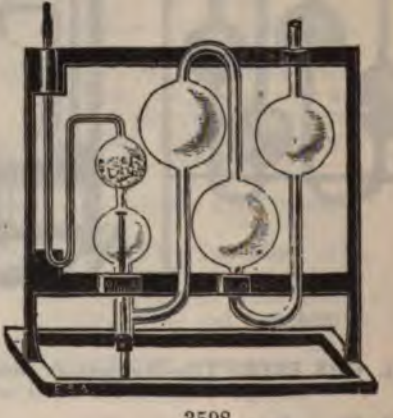


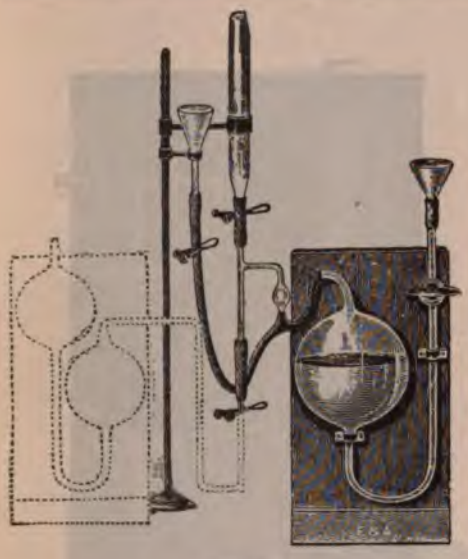
3598

3594. **GAS PIPETTE—Hempel, Explosion, tall form,** with electrode; mounted on wooden support **11.00**

3596. **GAS PIPETTE—Gill, Explosion,** of very heavy glass; mounted on iron stand **27.50**

3598. **GAS PIPETTE—Hempel, for preparing pure hydrogen,** mounted on iron stand **7.00**

3599. **Glass Parts** only for above **3.50**



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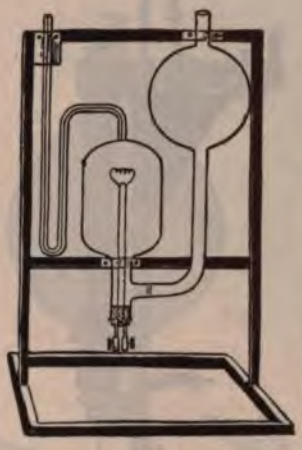

3602

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3600. **GAS PIPETTE—Hempel, for determining oxygen by the exact method;** mounted on wooden support **9.00**

3602. **GAS PIPETTE—Hempel, for estimation of methane, with platinum spiral;** mounted on iron stand **7.00**

3604. **GAS APPARATUS—Chancel,** for determining specific gravity of gases **4.00**

3606. **GAS APPARATUS—Schilling,** for determining specific gravity of gases **18.00**

3612–14

3616

3618

3620

GAS SAMPLING BULB—Of rubber, double acting, for taking samples for gas analysis. See No. 1286.

3612. **GAS SAMPLING TUBE—Glass,** capacity about 250 cc., with two stopcocks **4.00**

3614. **Ditto—Of heavy copper,** with two brass stopcocks **6.50**

3616. **GAS SAMPLING TUBE—Glass, U. S. Bureau of Mines' pattern,** with two stopcocks **5.75**

3618. **GAS SAMPLING TUBE—Winkler,** of zinc with two brass stopcocks; length 12 inches, diameter 4½ inches **4.00**

3620. **PALLADIUM TUBE—**Filled, for absorption of oxygen **2.50**

3642

3644

3622–24

3630

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3622. **GAS METER—The Laboratory Test Meter** has a 1/10th cu. ft. drum and dial reading from 1/1000 cu. ft. to 100 cu. ft. The drum and case are made of tinned sheet brass; the drum shaft of nickel silver. Complete with waterline gauge, thermometer, spirit level and leveling screws 88.00

3624. **GAS METER—The Photometer Meter,** similar to above, has a 1/12 cu. ft. drum, and an hourly rate dial reading from zero to 5 cu. ft. per hour. The legal rate at which gas should be burned to ascertain its candle power is 5 cu. ft. per hour; at this rate, the meter makes one revolution of the drum per minute 88.00

GAS METERS—Junker, and **Junker-Hinman,** see **Calorimeters** for **Gas.**

3630. **GAS APPARATUS—Harcourt Pentane Lamp.** Adopted as a standard by the English Gas Referees. Average value of this lamp as a standard is 9.98 candles. Directions for using are supplied with each lamp. With plain cock 130.00

3635. **GAS APPARATUS—Portable Cubic Foot Standard,** easily adjusted to deliver an exact cubic foot, total height 28", weight about 55 lbs. 270.00

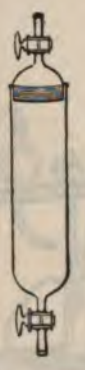
3638. **GAS APPARATUS—1/10 cubic foot.** Mounted on portable wooden stand, with adjustable shelves to hold a water reservoir. The bottle and reservoir are made of copper with brass fittings, the bottle being standardized by the Bureau of Standards, and furnished with certificate of accuracy; complete 104.5

3642. **GAS BALLOON—Glass,** for weighing gases; with stopcock 2.0

3644. **Ditto—Hind,** with stoppers, capacity 250 cc. The stoppers are so arranged that, when the side tube is connected with a gas generator, the gas will flow through the tank and out through the other necks. The flask is closed by simply turning the stoppers 2.7

GAS CANDLE BALANCE—See **Balance** No. 425.

3646



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3646. **GAS FILTER**—Of glass, with purified filter paper cup; 2½ inches long, 2⅛ inches diameter at top, tightly fitting so that all the gas passes through it. The connecting tube sealed in the glass stopper is one inch diameter, to fit the iron tube of a condenser for cooling the gas before it enters the filter **3.50**

3648. **GAS FILTER—With ground in connection,** to allow of tube being packed with cotton or glass wool, for collecting dust in gas samples. Length 300 mm., diameter 60 mm. **5.00**

3650. **GAS BAG—Rubber, Oval,** best make; without stopcock.

Capacity, gallons	1	2	3	5	10
Each	**3.50**	**4.00**	**4.75**	**5.50**	**13.50**

Socket and stopcock ..... **extra 1.25**
Hydrogen jet ..... **extra .60**

3652. **GAS BAG—Rubber, square,** best make.

Size, inches	18x24	20x30
Capacity, gallons	15	25
Each	**12.50**	**16.00**

Socket and stopcock ..... **extra 1.25**

GAS BOTTLES—See Flasks.

GAS WASHING BOTTLES—See Bottles.

3654. **GAS DISTRIBUTOR**—Of brass, with connections for three burners and one gas pipe; with stopcocks **8.00**

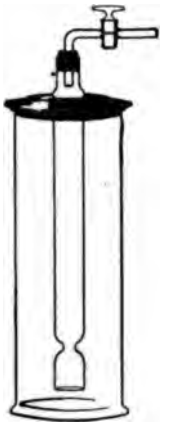
3656. **Ditto**—without stopcocks **5.00**

3658. **Ditto**—with three stopcocks and centre light **9.50**

3660. **GAS GENERATOR—Automatic,** for CO_2, H, H_2S, etc., consisting of a heavy glass jar, brass cover fitted with bell glass and brass stopcock; complete with lead tripod.

Height, inches	8	12	20
Diameter, outside, inches	5	6	6
Each	**10.50**	**11.50**	**16.50**

3663



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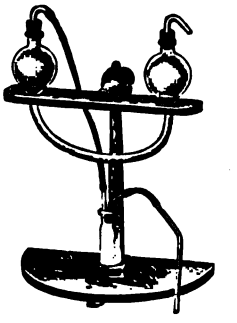


3666

3672

3663. **GAS GENERATOR—Banks (Patented)**—mostly used for H_2S, complete as illustrated with 3 hard rubber pinchcocks 4.50

Spare Parts

Manometer tube ..... .18
Iron Sulfide container with disc ..... .40
Hard rubber pinchcock ..... .35

This apparatus presents a most satisfactory solution of the H_2S problem. Precipitations are made in a closed flask, the H_2S being confined under pressure above the solution to be saturated. This allows more rapid absorption of the gas in proportion to the pressure, according to Henry's Law, and of course eliminates the nuisance and odor of H_2S in the laboratory.

The generator automatically maintains any desired pressure in the precipitating flask up to nearly 2 atmospheres, the gas being evolved only as fast as it is absorbed by the solution. This last feature means absolute economy and makes it possible for a very small generator to do the work of a much larger one of the old type.

3664. **GAS GENERATOR—Heumann,** for hydrogen, carbon dioxide, etc.

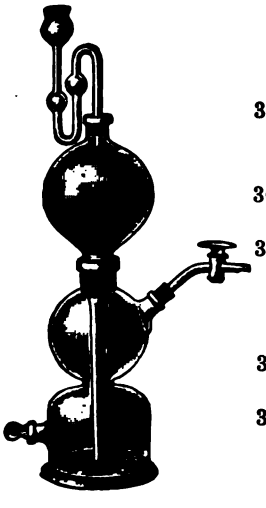
Capacity, liters	2	4	8
Each	9.00	13.00	18.00

3666. **GAS GENERATOR—Babo,** complete on stand with rubber stoppers and delivery tube 6.00

3667. Glass parts only for above 3.00

3672. **GAS GENERATOR—Hind,** for H_2S (Journal of Amer. Chem. Soc., Vol. XXXIII, p. 384). A simple and efficient apparatus for individual use. Glass parts complete as illustrated 6.[illegible]

3673. **Ditto**—with wooden support and clamp ..... 10.[illegible]



3674

3674. **GAS GENERATOR—Kipp,** the most popular generator designed; complete with safety funnel and glass stopcock.

Capacity, cc.	250	500	1000	2000	4000
Each	7.50	10.00	12.50	16.00	25.00

3676

3680

3680/1

3676. **GAS GENERATOR—Kipp,** with broad base; complete with safety funnel and glass stopcock.

Capacity, cc.	250	500	1000	2000	4000
Each	**7.50**	**10.00**	**12.50**	**16.00**	**25.00**

3680. **GAS GENERATOR—McCoy,** very efficient, being arranged to deliver the acid in drops, thus producing a steady and constant current of gas. Economical and easily cleaned.

Capacity, cc.	1000	2000
Each	**18.00**	**25.00**

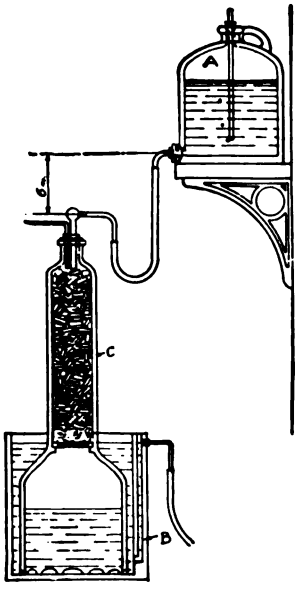
3682

3680/1. **GAS GENERATOR—For Hydrogen Sulfide, Munn,** Portable, light in weight, practically in one piece, self-regulating, easily cleaned, easily refilled, does not leak. For full details of the operation of the Generator, see the Journal of Industrial and Engineering Chemistry, Feb., 1918, Vol. 10, No. 2, page 130. Complete apparatus with stand and clamp 15.00

3680/1a. Glass parts only 13.00

3682. **GAS GENERATOR—For Oxygen.** A simple apparatus generating 100% pure oxygen from "Oxone," which is Sodium Peroxide in cartridge form. Each cartridge will produce on an average about 7 gallons of oxygen. Complete, with four oxone cartridges and full directions ..... [illegible]

3682a. Extra cartridges ..... [illegible]



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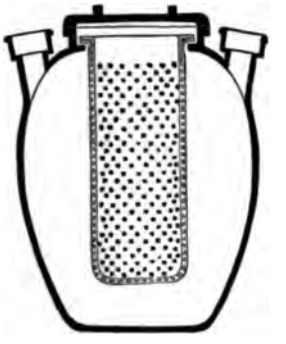

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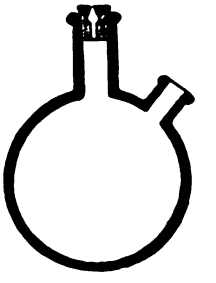


3690

3684. **GAS GENERATOR—Parsons, Improved Automatic,** for H_2S, CO_2 and H. *This is the most popular generator for large requirements; used by the majority of educational laboratories throughout the country to distribute H_2S to laboratory classes.*

The apparatus is perfectly automatic in action, and the refuse is automatically removed, while the pressure is almost constant. Only fresh acid comes in contact with the solid reagent, so that the full strength of the acid is utilized. There are no stoppers or valves, the apparatus being controlled entirely from the exits. It requires practically no attention, is easily cleaned and refilled without being taken apart. Forty outlets flowing at the rate of two bubbles every second can be furnished by one apparatus. Most instructors prefer exits for use with hydrogen sulfide to be situated in the hoods; the rubber connection containing a small piece of capillary tubing, being concealed behind a block, screwed to the wall; thus the student sees only a rubber tube protruding from a hole, and being unaware that his supply is limited by the size of the capillary, has no means of increasing the supply. Waste is thereby avoided.

Gas Generator of acid proof stoneware, complete with the necessary glass parts and rubber stoppers **43.00**

Iron sulfide granular about ½", free from dust, for use with this generator; in lots of 25, 50 and 100 pounds respectively ..... **per pound** **.15**

Lead Piping with series of outlets for hood. Price according to number of outlets and distance.

Renewals

Bottle A	**11.00**
Pot B	**13.20**
Tower C	**22.00**
Disc (perforated plate) E	**1.95**
Non-syphoning tube	**.80**

3688. **GAS GENERATOR**—For Chlorine and other gases. Of best acid proof stoneware, with air tight covers ground on and inside sieve with or without outlet at the bottom.

Capacity, gallons	6½	13	20	26½	33	40
Each	**16.00**	**26.00**	**32.00**	**42.00**	**52.00**	**00.00**

3690. **GAS GENERATOR**—For Chlorine. Of best acid proof stoneware, with perforated ground stoppers.

Capacity, gallons	⅛	¼	½	1	1½
Each	**4.00**	**4.50**	**7.50**	**8.50**	**12.00**

3692

3692. **GAS GENERATOR—Gasoline gas, E. & A.,** of galvanized iron, producing gas for Bunsen burners by means of compressed air. If good water pressure is available, the generator can be operated by a Richards Blast Apparatus, 2 pumps No. 772, otherwise by a Gramercy Blower No. 771 or similar. One charge will generate gas for 12 to 15 hours.

Size	small	large
For, number of Bunsen burners	5	10
Each	**20.00**	**25.00**

For larger requirements, see Gasoline Gas Machines No. 3704.

3693

3693. **GENERATOR—Gasoline Gas,** to be used where gas is not available, gives a flame and heat of absolute purity, fitting it for the most delicate chemical operations where gas cannot be used, owing to the presence of sulfur and other impurities.

Size of Generator	4x4x10″	10x10x18″
Capacity, about	¼ gallon	1½ gallon
Each	**12.00**	**24.00**

3698–3700

3702

3698. **GAS HOLDER**—of heavy zinc; with water gauge.

Capacity, gallons	5	10
Each	**31.50**	**38.50**

3700. **Ditto**—Of heavy copper.

Capacity, gallons	5	10
Each	**38.50**	**49.00**

3702. **GAS HOLDER—With sliding receiver,** made of leaded iron; mounted on iron frame, with pulleys and weights. Capacity 20 gallons **70.00**

GAS REGULATORS—See **Regulators.**

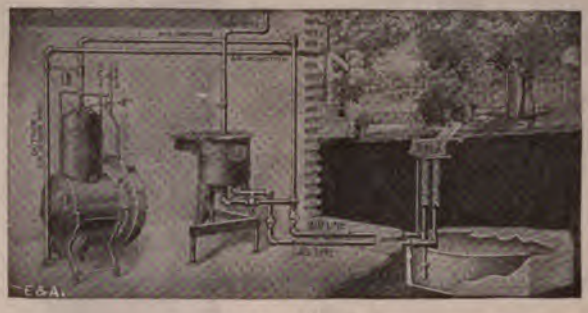
3704. Fig. I.

3704. **GAS GENERATOR—For Gasoline, Detroit.**

Entered in ("Class A") the highest class, by the National Board of Fire Underwriters.

A very satisfactory machine for laboratory purposes, generating uniform gas continuously without danger, smell or smoke. The Generator consists of an air blower, either weight (see Fig. I), or water driven (see Fig. II) (be sure to specify which type is desired); an automatic mixing regulator which is usually located in the basement; and a carburetor or generator which also serves as a storage tank, and is usually located about 30 ft. from the building and buried under ground. The weight type of machine requires an occasional winding. The water driven type is automatic; any plumber or gas fitter can easily install the apparatus by following instructions.

Export packing and cartage extra.



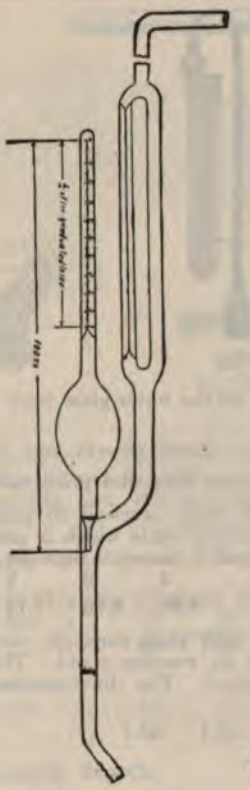
3704. Fig. II.

CAPACITIES, SHIPPING WEIGHTS, ETC., BOTH WEIGHT AND WATER DRIVEN TYPES

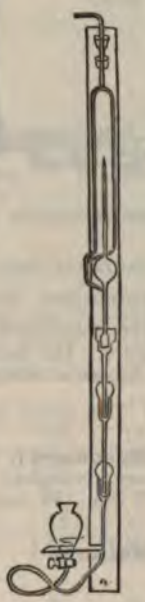
Capacity	Diameter of Pit for Carburetor or Generator	Shipping Weights: Either Weight or Water Driven T	
		Machine Complete with Automatic Mixing Regulator	Price
20 Light	75″	1110	**407.00**
30 "	78″	1185	**462.00**
40 "	84″	1480	**535.70**
50 "	90″	1520	**588.50**
75 "	96″	2125	**728.20**
100 "	102″	2715	**902.00**
150 "	108″	3250	**1072.50**
200 "	114″	3425	**1355.20**
300 "	126″	4500	**1584.00**
500 "	132″	5250	**2172.50**

Gasoline Gas Burners—See **Burners.**
Gas Measuring Tubes—See **Tubes.**
Gas Regulators—See **Regulators.**
Gas Washing Bottles—See **Bottles.**
Gas Washing Tubes—See **Tubes.**

3706



3709



3710

3712

3717

3706. **GAUGE—Pressure,** a spring gauge in brass case, nickel plated, indicating pressure in pounds up to 30 lbs.

Diameter, inches	3	5
Each	**4.00**	**5.00**

3708. **GAUGE—Vacuum,** a spring gauge in brass case, indicating vacuum in inches of mercury.

Diameter, inches	3	5
Each	**4.00**	**5.00**

3709. **GAUGE—Columbia University Model,** improved form of the **McLeod Vacuum Gauge,** mounted on oak board **25.00**

Besides retaining the features of the old McLeod Gauge of ease of reading and accuracy (to one ten-millionth of an atmosphere) the Columbia Model is easier to manipulate, simpler, smaller and more compact in construction; without ground joints.

3710. **GAUGE—McLeod,** for measuring vacuum down to 1/10 millionth of an atmosphere; mounted on board. Special forms made according to specifications and drawings. **65.00**

3712. **GAUGE—Segar Draft,** for measuring the draft in flues, etc., a very slight variation in the pressure shows a large difference on the scale. The gauge has to be filled with two immiscible liquids of different colors (1 Bottle 10% Copper sulfate, 1 Bottle Kerosene (red color) with alcanet or any kind of soluble dye oil-color), and of about the same density; mounted on board **8.00**

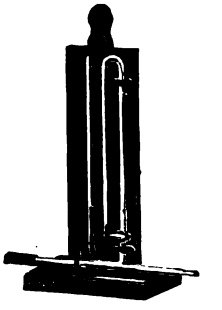
3714. **Ditto**—In case for carrying **17.00**

3717. **GAUGE—U shape,** made of heavy glass tubing.

Length, inches	12	24	36
Each	**.90**	**1.20**	**1.90**

3718

3722



3724

3718. **GAUGE—Schiele,** with graduations on the outer glass tube. Graduated to order in inches.

Length, inches	10	12	16
Each	**2.50**	**2.75**	**3.30**

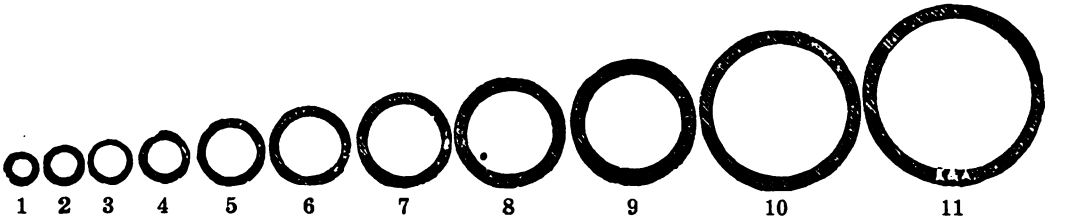
3720. Ditto—graduated in centimeters. Same sizes and prices as No. 3718.

3722. **GAUGE—Syphon,** very convenient form, screwed to piping wherever it is desired to measure the pressure. The boxwood scale which is graduated in inches and 1/10ths, and pounds and ounces as desired, is fastened between the limbs of the glass tube.

Length, inches	4	6	8	12	18	24	36
Each	**4.20**	**6.50**	**7.75**	**11.25**	**19.00**	**34.50**	**56.40**

3724. **GAUGE—Mercury (Manometer),** with glass stopcock, movable scale graduated in mm., filled with mercury; complete on wooden stand. The scale graduated in millimeters represents 76 cm. (30 inches). The difference in the mercury levels indicates the Pressure **12.00**

GAUGE—Wire, see **Measures.**



1 2 3 4 5 6 7 8 9 10 11

3730

GLASS BEADS—See **Beads.**

GLASS PLATES—See **Plates.**

3726. **GLASS RODS**—in lengths of about 5 feet.

Sizes, mm.	2–3	3–4	5–13	14–25
Price per lb.	**.80**	**.60**	**.50**	**.70**

3728. **GLASS STIRRING RODS**—Both ends rounded.

Length, inches	4	5	6	8	10	12	15
Diameter, inches	⅛	⅛	3/16	3/16	¼	3/16	⅜
Dozen	**.35**	**.40**	**.45**	**.55**	**.80**	**1.20**	**1.50**
Length, inches		15	18	20	24	30	36
Diameter, inches		¾	¾	¾	1	1	1
Dozen		**9.00**	**11.00**	**12.00**	**22.00**	**26.00**	**30.00**

RUBBER POLICEMEN for stirring rods, see No. 6032.

An extra charge is made for tubing selected according to a specific bore and outside diameter.

3730. **GLASS TUBING—Soft glass,** for glassblowing, bending, etc., in lengths not exceeding 5 feet.

Sizes external diameter, mm.	1½–2½	2½–3½	3½–4	5–25
Price per lb.	**1.20**	**1.00**	**.80**	**.50**
Sizes external diameter, mm.		26–37	38–50	50–65
Price per lb.		**.60**	**.80**	**1.20**

Tubing in small quantities, if required in standard 5-foot lengths, should be specified, "full length," otherwise smaller lengths may be sent.

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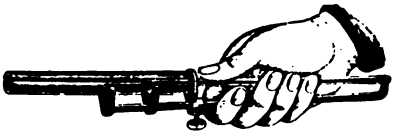

3762

3730/1. GLASS TUBING—as 3730, but **Heavy Wall.** Wall thickness (1½–2 mm.).
Same prices as No. 3730 **plus 8¢ per lb. extra.**
Extra Heavy Wall tubing (2½ mm. wall and up), see No. 3748 **Steam Gauge Tubing.**

3737. GLASS TUBING—Capillary, ½ to 1 mm. bore, 6–7 mm. external diameter.per lb. **.90**

3741. GLASS TUBING—Pyrex hard glass, softening at about 800° C.; in 36 inch lengths.

Outside diameter, approx. mm.	10	12	16	19	22	25	28
Per lb.	**1.00**	**1.00**	**1.20**	**1.20**	**1.50**	**1.50**	**1.50**

3741/1. GLASS TUBING—Combustion.

Outside diameter, approx. mm.	10	12	16	19	22	25	28
Per lb.	**1.60**	**1.60**	**1.60**	**1.60**	**1.60**	**1.60**	**1.60**

3741/2. GLASS TUBING—Combustion, Scotch.

Outside diameter, approx. inches	⅝	¾	⅞	1	1⅛
Per lb.	**1.50**	**1.50**	**1.50**	**1.75**	**1.75**

3746. GLASS TUBING—Barometer, all sizes .....per lb. **.90**

3748. GLASS TUBING—Steam Gauge, extra heavy wall, well annealed; for steam gauges, etc. .....per lb. **1.00**
When ordering, please send ring and plug to show o.d. and i.d.

3753. GLASS—French Sealing, Red .....per lb. **5.00**

3753/1. Ditto—White .....per lb. **4.00**

3753/2. Ditto—Blue .....per lb. **4.00**

3754. GLASS TUBES—Sealing, heavy walled American glass, with constriction for sealing off.

Length, cm.	50	60	70
Diameter, mm.	18	20	25
Each	**.55**	**.65**	**1.00**

Other sizes made to order.

3756. GLASS TUBES—Bomb, for Carius furnace, of best heavy American glass; 60 cm. long, 25 mm. outside diameter, one end closed .....each **1.00**
dozen **11.00**

Other sizes made to order.

3758. GLASS—Connecting Pieces, accurately ground to fit; with glass hooks for securing by rubber band.

Diameter outside, mm.	6	8	10	12
Each	**1.40**	**1.60**	**1.80**	**2.10**

3760. GLASS TUBE CUTTER—Griffin, made of nickel plated brass, fitted with spring, keeping it open and ready for use .....each **1.35**
Extra steel cutting wheels .....per dozen **1.80**

3762. GLASS TUBE CUTTER—Cuts tubing over ⅜ inch diameter, any length up to 10 inches .....each **1.50**
Extra cutting wheels .....per dozen **2.00**

3763/1

3772

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3784

3786

3763. **GLASS TUBE CUTTER—Steel Wheel** ..... .25

GLASS CUTTER—Diamond, see No. 2586–89.
See also Files, triangular.

3763/1. **GLASS CIRCLE MACHINE**—set with diamond suitable for cutting all kinds of glass from ½ to 12 inches 28.00

3764. **GLASS WOOL**—for filtering, etc.

Grade	Fine	Coarse
Per ounce	.40	.35
Per pound	4.00	3.50

3766. **GLOBE—Deflagrating,** of **Pyrex** glass; short ring neck.

Diameter, cm.	19	22
Capacity, liters	3	5
Each	.99	1.29

3768. Ditto—with support and cup 2.20 3.25

3770. **GOLDBEATER SKINS**—6 inch square ..... each .10

GOLD WASHING PANS—See Pans.

3772. **GLOVES—Asbestos Mittens** (for protection from heat, not acids) 4.00

3774. **GLOVES—Asbestos,** with thumb and four fingers 5.70

3776. **GLOVES—Assayers, Buckskin,** heavy leather throughout, with gauntlets 4.00

3778. **GLOVES—Heavy Rubber,** for acids, white, cloth lined, no gauntlets (especially adapted for protection from chemicals) 4.40

Rubber glove size regular	No. 14	corresponding to kid glove size	8
" " " "	" 15	" " " " "	9
" " " large	" 16	" " " " "	10

3780. Ditto—with 5 inch gauntlet 5.25

3782. **GLOVES—Rubber,** fine, black, cloth lined, no gauntlet (for protection from chemicals) 3.00

Rubber glove size regular	No. 10	corresponding to kid glove size	7
" " " "	" 11	" " " " "	8
" " " "	" 12	" " " " "	9
" " " large	" 13	" " " " "	10
" " " "	" 14	" " " " "	11

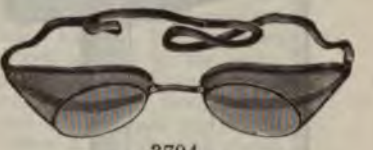
3784. Ditto—with gauntlet ..... 3.3[illegible]

3786. **GLOVES—Rubber,** pure gum, seamless, extra heavy, Maroon color (for hospital use) 1.7[illegible]

Rubber glove size	No. 7	corresponding to kid glove size	6
" " "	7½	" " " " "	6½
" " "	8	" " " " "	7
" " "	8½	" " " " "	7½
" " "	9	" " " " "	8

3790

3792



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3790. **GLUE VISCOSITY PIPETTE—Alexander,** with metal jacket **9.00**

Glue Boiler and Pot—see No. 866, &c.

Glue Hydrometer—see No. 4020.

Glue Viscosimeter—MacMichael, see No. 7367.

3792. **GOGGLES—Rubber,** best quality; made entirely of soft rubber, gas tight; with removable glasses **1.50**

3794. **Ditto—Colored glass,** for protecting the eyes ..... **.75**

3796. **GOGGLES—Albex** (patented), large curved lenses, in white, for laboratory use, grinders or machinists, etc. The lenses are replaceable **1.00**

3796/1. **Ditto**—with dark blue lenses, for furnace work **1.10**

3802

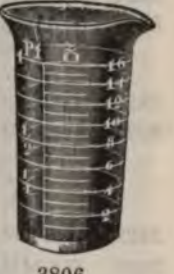
3798. **GOLD HORNS**—Length, 8 inches **1.50**

3802. **GRADUATE—Glass, cone shape,** accurately graduated.

Cap., dram.	1	2	ozs. ½	1	2	4
Each	**.47**	**.58**	**.35**	**.40**	**.42**	**.52**
Cap., ounces	8	12	16	24	32	64
Each	**.62**	**.82**	**1.05**	**1.55**	**1.80**	**4.50**

3803. **GRADUATE—Cone shape,** graduated in cc.

Cap., cc. ...	5	10	15	30	60	100
Each	**.47**	**.58**	**.42**	**.44**	**.50**	**.55**
Cap., cc. ...	125	200	250	375	500	1000
Each	**.60**	**.70**	**.77**	**1.00**	**1.25**	**1.90**



3806

3804. **GRADUATE—Glass, cone shape, double graduated** in ounces and cc.

Capacity, minims	60, 120	ounces	1	2	4	8	16	32
Capacity, cc.	5, 10		30	60	120	250	500	1000
Each	**.60 .70**		**.55**	**.60**	**.80**	**1.10**	**1.65**	**2.85**

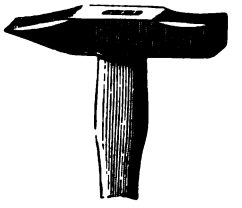
3806. **GRADUATE—Glass beaker shape,** graduated in ounces and cc.

Capacity, ounces	1	2	4	8	16	32
Capacity, cc.	30	60	120	250	500	1000
Each	**.55**	**.60**	**.80**	**1.10**	**1.65**	**2.85**

3809. **GRADUATE—Seamless measure,** enameled, double scale.

Capacity, ounces	8	16	32
Capacity, cc.	250	500	1000
Each	**1.40**	**2.00**	**2.50**

3812



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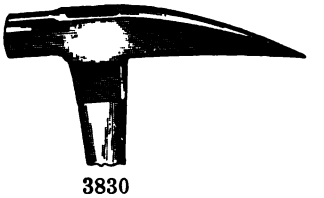

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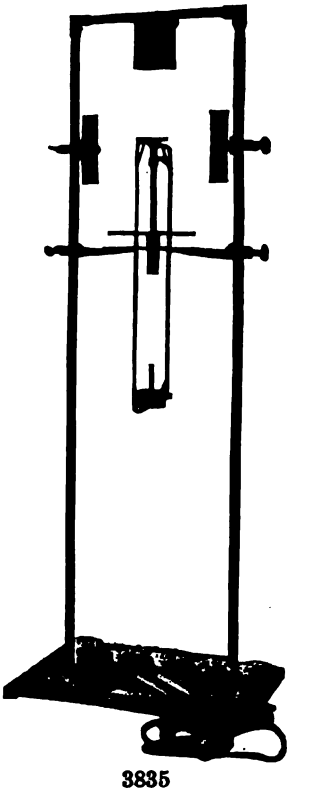


3835

3812. **GRADUATE**—Employed in the estimation of moisture in creosoted wood; see Forest Service Bulletin No. 134 of the U. S. Dept. of Agriculture. Stem graduated 12 cc. in 1/10ths, with funnel shape top **1.50**

GRADUATE—Cylindrical, see Cylinders.

3818. **HAMMER—Blowpiping, Plattner,** with wooden handle ..... **.75**

3820. **HAMMER—Blowpiping, Colton,** with wire handle **1.00**

3822. **HAMMER—Mineralogical,** sharpened at both ends.

Weight, ounces	11	18
Each	1.50	2.00

3824. **Ditto**—with both ends sharpened vertically; weight, ounces **1.50** **2.00**

3826. **HAMMER—Mineralogical, Dana,** square face, with sharpened vertical end.

Face, inches	¾	1	1¼	1½
Weight, pounds	¾	1 1/16	2 3/16	3 3/16
Each	1.50	2.00	2.40	3.00

3828. **HAMMER**—with sharpened horizontal end; weight about 11 ounces **1.65**

3830. **HAMMER—Prospector,** combined hammer and pick, heavy; with short handle **3.20**

3832. **HAMMER—Wedge shape,** for breaking ore, slagging, etc.

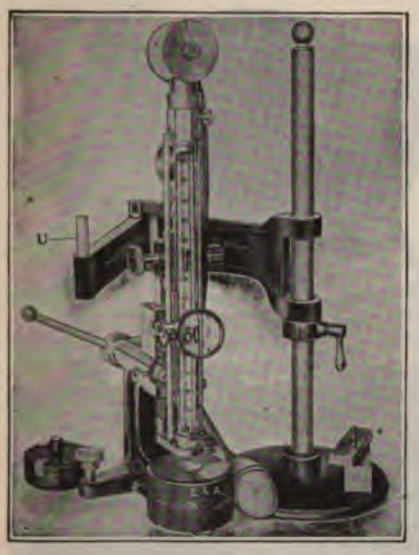
No.	1	2	3	4	5	6
Weight, ounces	7	10	15	18	21	26
Each	1.10	1.20	1.30	1.40	1.50	1.60

3834. **HAMMER—Prospector,** handle 3 ft. long marked in inches **2.40**

3835. **HARDNESS TESTING APPARATUS**—to determine the hardness of Butterfats and other fats. The apparatus comprises a firm support with electro-magnet on top to carry a lighter frame for carrying the penetrating needles and weights. Six penetrating needles are supplied with each apparatus, having cross-sectional areas of 5, 10, 15, 25, 50 and 100 sq. mm. and 6 brass weights with a range from 200 to 1400 grams **150.00**

(For exact description and method of operation see Journal of Ind. & Eng. Chem., Vol. VI, 1914, page 136.)

When ordering state Voltage of current for Electro-Magnet.



3836

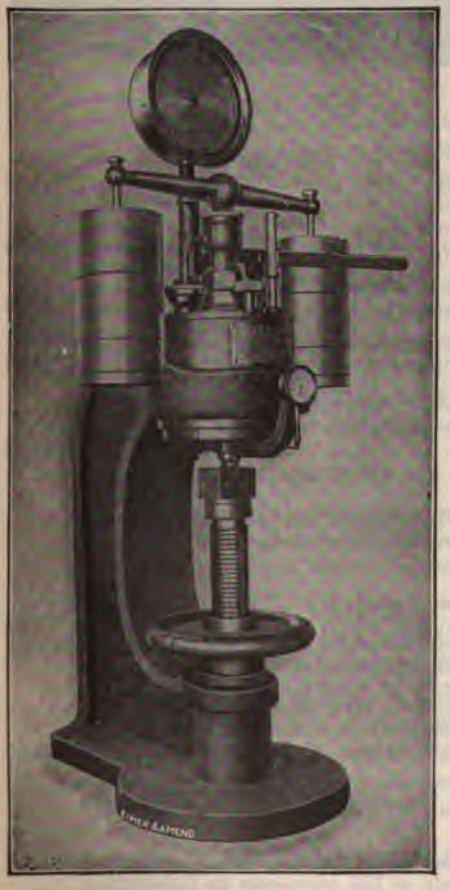
3836. **HARDNESS TESTER—The Scleroscope.** Consists of a cylindrical drop hammer working inside of a vertical graduated glass tube. The hammer has a diamond point and falls by its own weight, rebounding to variable heights depending on material being tested. The hardness of quenched steel is 100 on the scale. Hardnesses up to 130 and down to Zero can be measured. Outfit is mounted on substantial stand with plumb and levelling screws. There is an adjusting clamp and screw, a rubber bulb for air pressure to control the hammer, a lens for reading more accurately the height of the rebound, etc.

The outfit includes:

The Scleroscope as above,
Plaster mount vessel,
Nickeled and enameled swing arm and post,
Magnifier hammer (for soft metals only),
Soft steel reference bar,
Hard steel reference bar,
Fifty blank curve charts,
Polished hardwood and nickel carrying case.

Price—complete outfit **225.00**

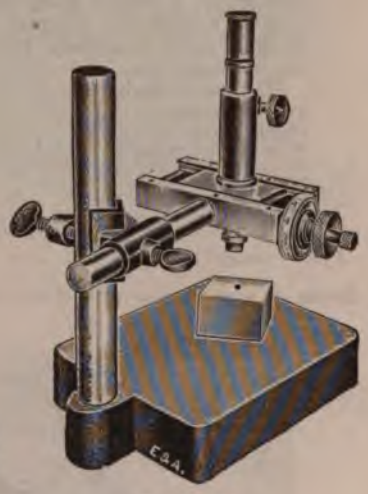
3836/1. **Same as above**—but with clock dial..... **250.00**



3837

3838

3837/3



3837/4

3837/2

3838/1

3837. **HARDNESS TESTER—Brinell,** American make, complete with controlling weights, but without microscope, magnifier, or depth gauge 315.00

For cut, see preceding page.

3837/1. **HARDNESS TESTER—Brinell,** same as above, but without weights 280.00

3837/2. **VERTICAL MAGNIFIER**—With this magnifier the diameter of the impression can be read to 0.1 mm .....**extra** 10.25

3837/3. **BRINELL COMPOUND MICROSCOPE**—Has a Ramsden eyepiece and a 32 mm. achromatic objective, and is therefore of greater accuracy than 3837/2 .....**extra** 35.00

3837/4. **BRINELL COMPOUND MICROSCOPE**—Has ocular with stationary cross hairs and an achromatic objective 42 mm. focus. This Microscope gives an accuracy to 1/1000 mm. 95.00

Note.—For description of Brinell Microscopes and Metallurgical Microscope Outfits, etc., see Bacteriological Catalog, Section I.

Any of above instruments Nos. 3837/2 to 3837/4, can be used for measuring the diameter of the indentation. Many experts, however, prefer to ascertain the depth of the indentation rather than the diameter.

3837/5. **DEPTH GAUGE**—for use with Brinell Hardness Tester No. 3837. This gauge measures depth of indentation to 1/100 mm. ..... 75.

3838. **HARDNESS TESTER—Brinell,** similar to No. 3837, but with two dials, one for regular use to measure the pressure applied, the other to be reserved as a test gauge, to check the pressure readings. This machine employs a Hydraulic Press with glycerine instead of weights. Pressure is applied by means of a hand wheel and can be regulated very accurately. Without magnifier, microscopes, or depth gauge ..... 350.

For cut, see preceding page.

For magnifier or microscopes to be used with this machine, see Nos. 3837/2 to No. 3837/4.

3838/1. **SPECIAL DEPTH GAUGE**—for No. 3838 machine. This depth gauge is graduated directly in hundredths of a millimeter. Total scale of 150 represents an indentation of 1½ mm. ..... 75.

3839

3839/1

3839. **HARDNESS TESTER—Brinell Meter, portable.** Total weight 6½ lbs., dimensions of case 9x6". With this machine impressions are made simultaneously on a standard bar of metal, and on the material being tested by means of a hammer blow. A comparison of the impression gives at once the hardness. Besides portability it has the advantage that determinations can be made at any chosen spot of a large casting, rail, ingot, etc.; also that tests are equally accurate in horizontal and vertical position, on thick and thin metal sections, for medium, hard and very soft metals, etc.

Outfit includes

1 Brinell Meter instrument.
6 Bars of carefully determined Brinell hardness.
12 Standard steel balls of exactly 10 mm. diameter.
2 special diameter measuring scales
(1 from 1.5 mm. to 3.5 mm.)
(1 from 3.0 mm. to 5.0 mm.)
These scales are divided in 1/20 mm. and permit accurate readings to 1/40 mm.
1 Set of direct-reading tables showing Brinell Hardness numbers.
1 Key for opening instrument to insert new ball.
1 Set of detailed instructions.
1 Leather-covered carrying case with snap-lock.

Price complete, not including hammer **55.00**

Extra Parts

a. Standard Bars, steel ..... each **1.00**
b. Standard Bars, brass ..... each **1.25**
c. Standard Steel Balls ..... per dozen **1.00**
d. Diameter Measuring Scale, 1.3–3.5 mm. ..... each **.15**
e. " " " 3–5 mm. ..... each **.15**

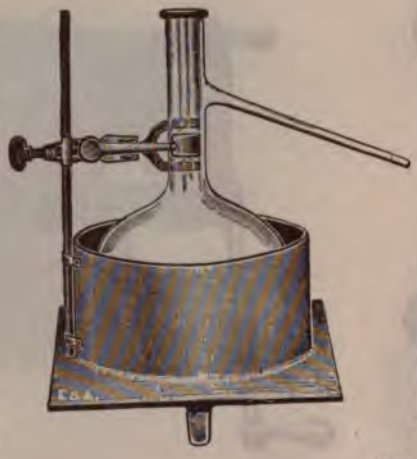
3839/1. **HARDNESS TESTER—Erichson,** for testing standard sheets and the ductility of strip metal. Latest improved model with self-contained gearing; shows "drawing qualities" of material on a direct-reading scale (divided into 1/100's mm. or 1/1000's inches); for testing standard specimens 3½" square and up to ⅛" thick **250.00**

a. Additional tools for testing metal strips between 1" and 3½" **30.00**
b. Additional tools for strips between $\frac{5}{16}$" and 1" **30.00**
c. Additional tools for testing wires $\frac{1}{32}$" to ⅛" diameter **40.00**

3840. **HARDNESS SCALE**—A set of 9 mineral specimens in cardboard box **2.50**

3842. **Ditto**—with diamond included **5.00**

3844



3854

3844. **HEATER—Flask,** electric, for distilling inflammables without danger by means of an electric lamp; complete with support as illustrated. (Flask not included.) For 1 pint flask **9.00**

3845. **Ditto**—for 1 quart flask **10.00**

Please state voltage when ordering.

3854. **HEATER—Combination, Electric,** complete with all attachments **50.00**

3854a. Extra heating units, either voltage ..... **each** **5.00**

The heater consists of an electric hot plate, with replaceable heating unit 5½ inches square, and a special temperature controller built in the casing. The upper part of the casing above the heating units has a small slide into which the undermentioned attachments are placed. For flask heating, distillation, etc., the hot plate attachment, size 8x9 inches, is removed to accommodate the flask heater, size 6x3¾ inches deep, which is provided with the support attachments illustrated. For use as a sand, oil or water bath, the cup shaped spun casing is placed over the cylindrical part of the flask heater. This combination can be used for numberless purposes requiring temperatures not exceeding 1000° F.

When ordering state voltage to be used.

3855

3855. **HEATER—Electric,** designed primarily for battery installation in the Kjeldahl Ammonia Determination for both digestion and distillation. The heat is even and constant, requiring no watching, the heaters are not affected by draughts of air; the heater complete **8.50**

(a) Heating Units for above	**2.55**	(e) Heating Unit Plate.	**1.00**
(b) Re-winding Heating Units	**2.10**	(f) Coiled Wire	**1.70**
(c) Cover Plates	**2.70**	(g) Fahnenstock Connector, single per doz.	**.70**
(d) Base Plates..	**3.35**	(h) Complete Terminals .....per doz.	**1.50**

3856

3856. **HEATER—Electric Coil,** for immersion in water, etc.; with three heats. After the desired temperature is reached, the heater may be regulated to maintain this temperature indefinitely, with reduced current consumption. The small heater will boil 1 pint of water in 10 minutes, the large one, 2 quarts in 8 minutes.

Diameter, inches	6½	8½	11
Depth	3	4	4½
Height, inches	15	18	23
Watts required	110 to 440	275 to 1100	412 to 1650
Each	**22.00**	**43.00**	**50.00**

3858

3858. **HEATER—Flask,** of sheet iron, with asbestos strips fastened to sides.

Dia., in. ..	4¼	5	6	7⅛	8¼	10½
Each	**1.10**	**1.25**	**1.35**	**1.60**	**2.00**	**2.60**

3860. **Ditto**—Set of 5, from 4¼ to 8½ inches **7.00**

3862. **Ditto**—Set of 6, from 4¼ to 10½ inches **9.50**

3864. **HEATER—Fletcher, Instantaneous Water Heater,** of brass and copper, nickel plated; height 18 inches, projection from wall, 6 inches..... **41.00**

3866. **HEATER**—similar to above, **large size,** height 19 inches, projection from wall 8 inches **47.00**

3868. **HEATER—Fletcher, water, low form,** very satisfactory and inexpensive; with burner **10.25**

3870. **Ditto**—for gasoline gas, with wheel valve **12.55**

3872. **Ditto**—without burner **7.00**

3874. **HEATER—Freas Water.** A simple heater, operated by steam; for students' individual use and small laboratory requirements where steam pressure higher than the water pressure is available. The threaded connection is attached to the water faucet, and the side tube to the steam supply. The heater is practically instantaneous **6.00**

3874a. Coupling for smooth faucet .....**extra** **1.00**

3864

3868

3874

Multiple Replaceable-Unit Electric Hot Plates

750° F. (400° C.) Maximum 160° F. (71° C.) Minimum

Multiple-Unit Hot Plates give temperatures twenty-five per cent. higher than other makes with equivalent current, and the same temperatures with thirty per cent. less current. The units are readily renewable by the operator. Each unit is replaceable by loosening terminal connections at six exposed binding posts on the bottom of the apparatus.

The base and top plate are of cast iron—the top plate, with polished surface, rests on the units, free from contact with the base, which obviates the loss of heat by conduction. Units, two or four in each plate, are moulded "Electrobestos" grooved to receive the heating elements, which are imbedded in a refractory cement. The units rest on bricks of low thermal-conductivity, having a conductivity of about one-tenth that of ordinary fire bricks. This forces to the top of the plate a maximum amount of heat generated and affords a comparatively cool atmosphere to the under side of the apparatus. The increased efficiency is a net saving in current cost and gives higher temperatures and quicker maximum heats.

3877

3879–3885

3885
Showing inside arrangement

MULTIPLE REPLACEABLE-UNIT HOT PLATES—Continued.

Number of Heats—Each of the four sizes of Hot Plates is furnished for Three heats on either 110 or 220 volts. When the Hot Plate is used on 110 volts only, the connector plug at the rear may be shifted to the connector pins designed for 220 volts. This **"Shifted Voltage"** gives an **additional three heats,** making the Hot Plate readily desirable for alcohol extractions, ether evaporations and such similar low temperature work.

Price List

Table of Temperatures Obtainable, and Current Consumption

	Size in Inches	110 OR 220 VOLTS						"SHIFTED VOLTAGE"						Price
		Low		Medium		High		Low		Medium		High		
		Degrees F.	Watts	Degrees F.	Watts	Degrees F.	Watts	Degrees F.	Watts	Degrees F.	Watts	Degrees F.	Watts	•
3875/1.	6½x18	400	285	600	570	750	860	160	75	240	150	360	225	**35.00**
3877/1.	12½x12¼	400	352	600	704	750	1056	160	94	240	187	360	275	**40.00**
3879/1.	12¼x18	400	520	600	1030	750	1550	160	145	240	290	360	435	**57.50**
3881/1.	18x12¼	400	520	600	1030	750	1550	160	145	240	290	360	435	**57.50**
3883/1.	18x24	400	1025	600	2050	750	3080	160	255	240	515	360	770	**87.50**
3885/1.	24x18	400	1025	600	2050	750	3080	160	255	240	515	360	770	**87.50**

Each Plate is supplied with 6 feet of Connector Leads with Connector Plug.

3891

3891. **HOT PLATE—Electric, Circular, three heats.** These are equipped with regulating switch, which allows three degrees of heat, making it possible to obtain just the heat required and to effect economy by using only what current is needed.

Dia., in.	6	7	8	9
Watts required.	150-300-600	200-400-800	237-475-950	275-550-1100
Each....	**12.30**	**17.10**	**19.80**	**23.40**

3894

3894. **HOT PLATE—Electric,** for the laboratory, size 6", arranged for 4 heats (150-275-325-600 watts). The top has an inner disc 3½" wide with an outer ring 6" over all with separate heat control making two stoves in one **11.00**

3895/1

3897

3895/1. **HOT PLATE—Multiple, Replaceable Unit, Electric,** for ether extractions, etc. Size 4½x24 inches, arranged for 3 heats, requires from 200–600 watts; with cord and snap switch **35.00**

3897. **HOT PLATE—Gramercy Electric,** for ether extractions, etc. This comprises a set of heaters 4½ inches diameter, mounted on asbestos wood box, each provided with separate snap switch, which allows the use of any heater to be discontinued without placing the others out of service. Each heater requires 100 watts for three heats.. **82.50**

3899

3899/1

3899/2

3899. **HOT PLATE—Electric, Square, three heats,** with plug switch and cord.

Size, inches	9x12	12x18	18x24
Watts required	880	1500	2800
Each	**30.00**	**45.00**	**85.00**

3899/1. **HOT PLATE—For Coal Gas,** with radial burners and stopcocks.

Size of top plate, inches	11½x18¾	19½x22½	35x21
Number of burners	2	3	5
Each	**12.00**	**17.00**	**33.00**

3899/1a. **HOT PLATE—Same** as 3899/1, but for gasoline gas.

Each	**13.00**	**18.50**	**35.50**

3899/2. **HOT PLATE—For Gas,** extra heavy, with polished steel top.

Size of top plate, inches	14x18	18x24	18x30	18x36
Number of burners	3	5	6	8
Each	**25.00**	**35.00**	**45.00**	**55.00**

3899/2a. **HOT PLATE**—Same as 3899/2, but for gasoline gas.

Each	**36.50**	**53.50**	**68.00**	**87.00**

HOMEOPATHIC VIALS—See Bottles.

Hydrometers

All of our hydrometers are made in the hydrometer section of our glass blowing establishment. Every hydrometer whether shot or mercury filled is accurately checked. Each one is carefully finished so as to present a fine appearance. Special attention is directed to the high reputation of our precision hydrometers for all of the various scales.

3900

3920

3900. **HYDROMETER—Baumé, for heavy liquids, standard quality**; length **6 inches**, subdivided in ½ degrees.

Range, degrees	0–20	20–40	40–60	45–55	55–65
Each	1.20	1.20	1.20	1.20	1.20
Dozen	12.00	12.00	12.00	12.00	12.00

3902. **HYDROMETER**—as above, **6 inches long**, with one mark at 1.186 at 65° F....each 1.00

3904. **HYDROMETER—Baumé, for heavy liquids, ordinary quality**; length about **12 inches**, subdivided in single degrees. American standard.

Range, degrees	0–50	0–70
Each	.75	.75
Dozen	7.50	7.50

3906. **Ditto—Standard quality**, each 1.00 1.00
Dozen 10.00 10.00

3907. **HYDROMETER—Baumé**, for heavy liquids, **12 inches** long, subdivided in ½ deg. **0–30 deg., ordinary quality** 1.00

3907/1. **HYDROMETER**—Same as above, but **standard quality** 1.25

3908. **HYDROMETER—Baumé, for heavy liquids, standard quality**; length about **12 inches**, subdivided in 1/10th degrees. 0–10°, 10–20°, 15–25°, 25–35°, 30–40°, 35–45°, 40–50°, 45–55°, 50–60°, 55–65°, 60–70° .....each 1.75
dozen 17.50

3910. **Ditto**—with thermometer combined .....each 3.50

3914. **HYDROMETER—Baumé, for light liquids, standard quality**; length about **12 inches**, subdivided in **1/10th degrees**. 21–10°, 31–19°, 41–29°, 51–39°, 61–49°, 71–59°, 81–69°, 91–79°, 100–89° .....each 1.75
dozen 17.50

3916. **Ditto**—with thermometer combined .....each 3.50

3917. **HYDROMETER—Baumé**, for light liquids, length about **6 inches**, subdivided in ¼°, ranges same as number 3914, **standard quality** .....each 1.50
dozen 15.00

3917/1. **Ditto**—With thermometer combined .....each 3.25

3918. **HYDROMETER—Baumé and Sp. Gr. scales, for light liquids, standard quality**; length about **12 inches**.

Sp. Gr. scale, degrees	0.700–1.000	0.700–0.850	0.850–1.000
Bé scale, degrees	70–10	70–34	34–10
Each	1.90	1.90	1.90
Dozen	19.00	19.00	19.00
Sp. Gr. scale, degrees	0.700–0.800	0.800–0.900	0.900–1.000
Bé scale, degrees	70–44	44–25	25–10
Each	1.90	1.90	1.90
Dozen	19.00	19.00	19.00

3920. **Ditto**—0.700 to 1.000 Sp. Gr. and 70–10 Bé scale, with thermometer combined ....each 3.75

3922. **HYDROMETER—Baumé and Sp. Gr. scales for light liquids, standard quality**; length about **6 inches**.

Sp. Gr. scale, degrees	0.700–1.000	0.700–0.800	0.800–0.900	0.900–1.000
Bé scale, degrees	70–10	70–44	44–25	25–10
Each	1.40	1.40	1.40	1.40
Dozen	14.00	14.00	14.00	14.00

3924

3922. HYDROMETER—Baume and Sp. Gr. scales, for heavy liquids, ordinary quality: length about 12 inches

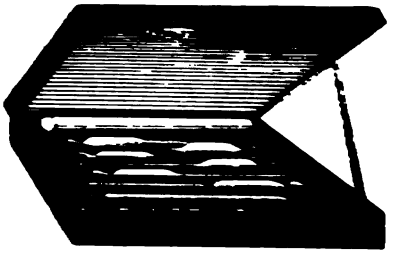
Sp. Gr. scale degrees	1.000–2.000	1.000–1.400	1.400–2.000	1.000–1.200
Be. scale degrees	6–76	6–41	41–76	6–24
Each	1.80	1.80	1.80	1.80
Dozen	16.80	16.80	16.80	16.80
Sp. Gr. scale degrees	1.200–1.400	1.400–1.600	1.600–1.800	1.800–2.000
Be. scale degrees	24–41	41–54	54–65	65–76
Each	1.80	1.80	1.80	1.80
Dozen	16.80	16.80	16.80	16.80

3923. HYDROMETER—Standard quality, same range as No. 3924 each 1.90
dozen 19.80

3925. HYDROMETER—1.000 to 2.000, standard quality, with thermometer combined each 3.75

3926. HYDROMETER—6 inches long without thermometer, same range as No. 3924 each 1.40
dozen 14.80

3927. HYDROMETER—Universal, from 0.700 to 2.000 each 3.75



3934

3934. HYDROMETER—Standard, of resistance glass, highest grade, for scientific work, accurate to the fourth decimal place. Length about 37 cm.

No. 1 from 0.700 to 0.760	No. 11 from 1.300 to 1.360
No. 2 from 0.760 to 0.820	No. 12 from 1.360 to 1.420
No. 3 from 0.820 to 0.880	No. 13 from 1.420 to 1.480
No. 4 from 0.880 to 0.940	No. 14 from 1.480 to 1.540
No. 5 from 0.940 to 1.000	No. 15 from 1.540 to 1.600
No. 6 from 1.000 to 1.060	No. 16 from 1.600 to 1.660
No. 7 from 1.060 to 1.120	No. 17 from 1.660 to 1.720
No. 8 from 1.120 to 1.180	No. 18 from 1.720 to 1.780
No. 9 from 1.180 to 1.240	No. 19 from 1.780 to 1.850
No. 10 from 1.240 to 1.300	

The thermometer spindle, when placed in the liquid, indicates number of hydrometer to be used.

Set of 19 hydrometers with one thermometer spindle, complete in wooden case 80.00
Single hydrometers any range included in the set each 4.30

3936. HYDROMETER—Standard, supplementary to above. Spindle No. 02 from 0.600–0.650. Spindle No. 20 1.540 to 1.920. Spindle No. 01 from 0.650–0.700. Spindle No. 21 1.920 to 2.000.

Set of 4 hydrometers, in wooden case 25.00
Single hydrometers each 4.30

3938. HYDROMETER—Standard, small size, same ranges as No. 3934, 15–16 cm. long for small quantities of liquids, showing Sp. Gr. to the third decimal place.

The thermometer spindle, when placed in the liquid, indicates number of hydrometer to be used.

Set of 19 hydrometers, with one thermometer spindle, complete in wooden case 60.00
Single hydrometers any range included in the set each 3.00

3940. HYDROMETER—Standard, small size, supplementary to above set, same ranges as under No. 3936

Set of 4 hydrometers, in wooden case 20.00
Single hydrometers each 3.00

3942

3942. **HYDROMETER—Twaddle, for heavy liquids, ordinary quality;** length about 12 inches; the degrees marked on the scale, multiplied by 5 and added to 1000, gives the specific gravity.

	in 1/10°		in ½°						
No.	00	0	1	2	3	4	5	6	7
Range, deg.	0–6	0–10	0–24	24–48	48–72	72–102	102–134	134–160	160–185
Each	**1.60**	**1.30**	**.80**	**.80**	**.80**	**.80**	**.80**	**.80**	**.90**
Dozen	**16.00**	**13.00**	**8.00**	**8.00**	**8.00**	**8.00**	**8.00**	**8.00**	**9.00**

3944. **HYDROMETER—Twaddle, Standard quality.**

Each	**2.20**	**1.90**	**1.25**	**1.25**	**1.25**	**1.25**	**1.25**	**1.25**	**1.35**
Dozen	**22.00**	**19.00**	**12.50**	**12.50**	**12.50**	**12.50**	**12.50**	**12.50**	**13.50**

3946. **Ditto**—with thermometer combined, standard quality .....**each** **3.35**

3948. **HYDROMETER—Twaddle, small size,** 6 inches long, standard quality, same ranges as No. 3942 from No. 1 up .....**each** **1.10**

3949. **HYDROMETER—Twaddle,** length 13 inches, graduated in 1/10°, ranges 0–15°, 15–30°, 30–45°, 45–60°, etc., **ordinary quality** .....**each** **1.60**

3949/1. **HYDROMETER—Twaddle,** same as above, etc., **standard quality** .....**each** **1.80**

3950. **HYDROMETER—Twaddle,** set of 7, **standard quality,** with extra thermometer, in case **15.00**

3950/1. **HYDROMETER—Twaddle,** as used by the Borden Co., large size, very carefully calibrated to 1/10 deg.
Range, degrees ..... 5–8 9–12 12–16 15–19 **each** **1.75**

Hydrometers—for Sugar

See also Nos. 4050 *and* 4052

3951. **HYDROMETER**—for sugar and syrup, 0–50° in single degrees Baumé, at various temperatures, 17½–70–75, etc., shot filled, made to order in ½ dozen lots only...**each** **.80**

3951/1. **HYDROMETER**—Baumé, for sugar, graduated in ¼ deg. at 17½ or 20° C., ranges 0–10, 5–15, 10–20, 25–35, etc., length of hydrometer 12 in., made to order in ½ dozen lots only .....**each** **1.50**

3952

3958

3952. **HYDROMETER—Brix, graduated in 1/2°,** standard quality; 0–30°, 30–60°, 60–90° .....**each** **1.50**

3954. **Ditto**—with thermometer and correction scale combined .....**each** **3.25**

3956. **HYDROMETER—Brix, graduated in 1/5°,** standard quality; 0–30°, 30–60°, 60–90° .....**each** **1.75**

3958. **Ditto**—with thermometer and correction scale combined .....**each** **3.50**

3960. **HYDROMETER—Brix, graduated in 1/10°,** standard quality. Scale with range of 10°, from 0°–10°, 10°–20° and so on up to 90°–100° .....**each** **1.75**
dozen **17.50**

3962. **Ditto**—with thermometer and correction scale combined .....**each** **3.50**

3964. **HYDROMETER—Brix, graduated in 1/10°,** standard quality; 0–15°, 15–30°, 30–45°, 45–60°, 60–75°, 75–90° .....**each** **2.00**

3966. **Ditto**—with thermometer and correction scale combined .....**each** **3.75**

3998

3968. **HYDROMETER—Brix, graduated in 1/20°**, standard quality. Scale with range of 5°, from 0–5°, 5–10°, and so on up to 95–100° ..... each **2.50**

3968/1. **Ditto**—with thermometer and correction scale combined ..... each **4.25**
Special Brix Hydrometers will be made to order in ½ dozen lots only for any range and temperature desired with or without thermometer and correction scale. Give full specifications.

HYDROMETER—Acid, see Baumé.

Hydrometers—for Alcohol

HYDROMETER—Alcohol, Salleron, for use with still, see No. 2726, A. and B.

3970. **HYDROMETER—Alcohol and spirits**, Gay Lussac **1.50**

3972. **Ditto**—with thermometer and correction scale **4.00**

3974. **HYDROMETER—Alcohol and spirits**, Tralle and proof scales **1.50**

3976. **Ditto**—with thermometer, U. S. Custom House Standard and correction scale **3.75**

3978. **HYDROMETER—Alcohol and spirits**, Tralle & Richter scales, volume and weight per cent; with thermometer and correction scale **3.75**

3979. **HYDROMETER—Alcohol, Cartier**, range 10–45° in ½° **1.50**

3979/1. **HYDROMETER—Alcohol, Cartier & Tralle or Gay Lussac** **2.00**

3979/2. **Ditto**—with thermometer combined **4.00**

3979/3. **HYDROMETER—Tralle**, standard quality, 12 inches long, without thermometer.

Range, degrees	0–5	0–10	0–20	20–40	40–60	60–80	80–100	90–100
Subdivisions	1/10°	1/10°	1/5°	1/5°	1/5°	1/5°	1/5°	1/10°

each **3.25**

3979/4. **Ditto**—with thermometer ..... each **5.00**

3980. **HYDROMETER—Alcohol and spirits**, Inland Revenue standard; set of 5, 0–100°, 80–120°, 100–140°, 130–170° and 160–200°, in single degrees **16.00**

3982. **Ditto**—single instruments ..... each **3.25**

3984. **Ditto**—Set of 5, complete with an 8-inch copper can, and thermometer; in polished black walnut chamois lined case **32.40**

3985. **HYDROMETER—Wood Alcohol**, scale 0–100°, without thermometer **1.50**

3986. **HYDROMETER—Wood Alcohol, Tralles**, 0–100°; with thermometer and correction scales **3.75**

Hydrometers—for Special Purposes

3988. **HYDROMETER—Ammonia**, scale 35–10°, Baumé in ½°, shot weighted **1.00**

3990. **HYDROMETER—Bark liquid, Barkometer**, 1.000 to 1.060, shot weighted **1.50**

3992. **HYDROMETER**—mercury weighted, with thermometer and correction scale **3.25**

3996. **HYDROMETER—Battery**, 5 inches long, scale 1.150 to 1.300 ..... **1.00**

3998. **HYDROMETER—Battery (Syringe)**, specific gravity scale 1.150 to 1.300 in .01 graduations, with rubber buffers to prevent breakage of hydrometer, length over all 12 inches. Each packed in cardboard box with full directions for use **2.25**

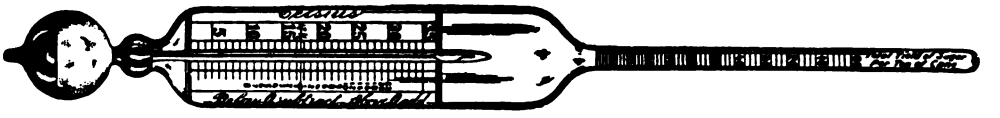
3999. **HYDROMETER**—for **Beer and Wort, Balling**, 0–24 in ½° **1.50**

4000. **HYDROMETER—Beer, Balling**, 0–24° in 1/10ths; with thermometer and correction scale **4.00**

4001. **HYDROMETER—Beer, Balling**, set of 3, 0–8, 8–16, 16–24 in. 1/10°, with thermometer and correction scale **12.00**

4002. **HYDROMETER—Benzine**, scale 90–60° Baumé **1.25**

4003. **Ditto**—with thermometer **3.25**



4050

4006. **HYDROMETER**—small size, 6 inches long, 80–60° Baumé **1.00**

4008. **HYDROMETER—Chlorine,** 0–9° Baumé in 1/10th, shot weighted **1.00**

4010. **HYDROMETER—Cider,** 10–30° Baumé, shot weighted **1.00**

4012. **HYDROMETER—Coal Oil,** 100–10° Baumé **1.00**

4013. **Ditto**—with thermometer **3.75**

4018. **HYDROMETER—Ether,** 0.750–0.700; with thermometer **3.50**

HYDROMETER—Gasoline, see Coal Oil.

4020. **HYDROMETER—Glue,** 0–12° Baumé in ¼° at 150° F. **1.00**
Other ranges at various temperatures made up to order in ½ doz. lots only.

4021. **HYDROMETER—Gluometer,** showing percent of dry glue, with thermometer and correction scale, length 15″, graduated 0–50° in ½%, temperature 75° C. **4.75**

4022. **HYDROMETER—Glycerine,** 25–30° Baumé in 1/10th **1.75**

4024. **HYDROMETER—Milk, Lactometer,** N. Y. Board of Health pattern, scale reads percents; 100 = 1.029 Sp. Gr., 75 = 75% milk, and so on **1.25**

4026. **Ditto**—with thermometer **4.00**

4028. **HYDROMETER—Milk, Quevenne's,** Sp. Gr. 1.014–1.042 ..... **1.25**

4030. **Ditto**—with thermometer **4.00**

4031. **HYDROMETER**—for Paper Mills, for Rosin size solution, 0–2 Bé in 1/10°, very accurate **3.00**

4033. **Ditto**—Same as above, graduated in 1/20°, 1/50°, or 1/100° **3.50**

4036. **HYDROMETER—Molasses, Valley, Osmosemeter,** 0–10½°; shot weighted **2.00**

4038. **HYDROMETER—Fatty oils,** showing Sp. Gr. of the different oils **2.25**

4040. **Ditto**—with thermometer **4.75**

4041. **HYDROMETER**—Salt Salinometer showing **direct** percentage of salt –10–100% **2.00**

4042. **HYDROMETER**—Salt Salinometer showing percentage of salt 0–100% **1.00**

4043. **HYDROMETER—Salinometer,** for sea water, showing 3 scales at temperatures of 190, 200 and 210° F. shot filled **1.00**

4044. **HYDROMETER—Silver Solution** **1.00**

4046. **HYDROMETER—Sweet Water Spindle,** minus 5 to + 5° in 1/10th **1.50**

4048. **HYDROMETER—Sweet Water, Valley, Osmosemeter,** 0–10½°; shot weighted **2.00**

4050. **HYDROMETER—Sugar, Morse, Rendimiento,** densimeter for tropical cane sugar factories. A special hydrometer with thermometer combined, for determining the possible yield of sugar from the cane, by the density of the raw juice. The Hydrometer shows how much sugar to expect, and by comparing this with the actual yield, the efficiency of the factory work can be estimated **6.50**

4052. **HYDROMETER—Sugar, Morse, Tare Room,** for Beet Sugar Factories. A specially constructed hydrometer with the thermometer combined, for determining the percentage of sugar in the beet, from the specific gravity of the raw beet juice. The graduated scale is based on actual results obtained by testing thousands of beet juice samples.

No.	1	2	3
Percentage of sugar in beets	11–16	16–21	21–26
Each	**6.50**	**6.50**	**6.50**

HYDROMETER—Urine, see Urinometers.

4060

4060 Fig. 2

4054. **HYDROMETER—Vinegar,** showing percentage of acetic acid, shot weighted **1.00**

4055. **HYDROMETER—Vinegar,** showing **direct** percentage of acetic acid **1.50**

4055/1. **HYDROMETER—Vinegar,** showing **direct** percentage of acetic acid, with thermometer **3.75**

4056. **HYDROMETER—Vinegar, Solidimeter,** for solids in vinegar; with thermometer.. **4.00**

4057. **Ditto**—without thermometer **1.75**

4058. **HYDROMETER—Wine and Must,** Oechsle **2.50**

4060. **HYDROMETER—"E. & A." (Patented), for determining Specific Gravity of light and heavy Liquids in small (5 cc.) and large quantities, as well as solids** **7.50**

4062. **Ditto**—In velvet lined case for carrying **12.50**

This instrument is provided with three scales on the one stem. Fig. 2 shows the paper scale laid out flat, before being placed in the stem of the hydrometer.

1st Scale—Graduated from 0.700 to 1.000 for light liquids in bulk.

2nd Scale—Graduated from 1.000 to 1.400 for heavy liquids in bulk.

3rd Scale—Graduated in grams and tenths of a gram, serving as a balance, for determining specific gravity of light or heavy liquids and solids, which are placed in the small graduated stoppered bulb of the instrument.

Descriptive pamphlet of this truly universal hydrometer on request.

4064. **HYDROMETER—Sommer (Patented), for Asphalts,** Waxes and all kinds of semi-solid, solid-adhesive, and flexible materials. Outfit with hydrometer reading 0.850 to 1.300 at 25° C., as recommended by The Committee of the American Society of Civil Engineers; with brass receptacle and fittings. For illustration, see page 18. Descriptive pamphlet on request **12.00**

4066. **Ditto**—graduated 0.950 to 1.100, with brass receptacle and fittings; complete in case with instructions **12.00**

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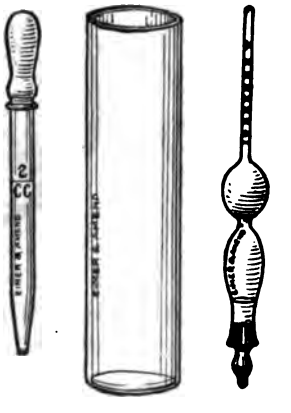

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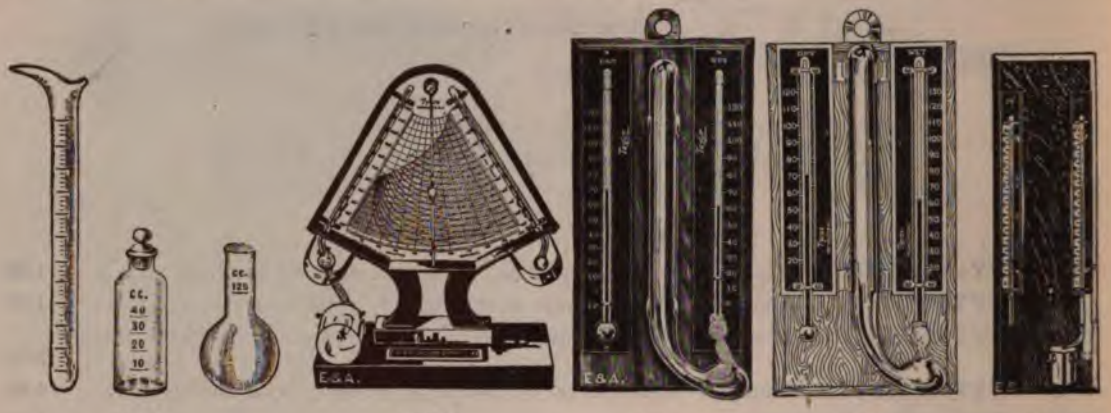
4068. **HYDROMETER—Nichols,** of brass **6.00**

4070. **HYDROMETER—Failyer,** of glass; a combination of Nichols and Baumé forms, designed for taking Sp. Gr. of minerals **4.00**

4072. **HYDROMETER—Saxe, Areo-Picnometer,** for testing small quantities, only about 3 cc. of solutions being necessary; range 1.000 to 1.060 in velvet lined case **6.00**

4074. **HYDROMETER—Lunge, Tar Tester,** see Lunge, Tar and Ammonia **9.00**

HYDROMETER—Jars, see Cylinders.



4076 4082 4084 4086 4092

4076. **HYDROTIMETER—Bouton-Boudet,** for determining the hardness of water by means of soap solution; burette, shaking flask and boiling flask, with directions **3.50**

4082. **HYGROMETER—Hygrodeik,** for determining the relative and absolute humidity, dew point, and foretelling frosts, without any reference to tables; card dial, black japanned iron frame, scale range 20 to 120° F. **13.50**

a. Extra Thermometers for above .....each **3.25**

b. Extra silk wicks .....dozen **1.25**

4084. **HYGROMETER—Mason,** with brass scales mounted on oak board, size 11x5 inches; scale range approximately 10–140° F.; with tables and directions **3.60**

a. Extra silk wicks .....dozen **1.50**

4086. **HYGROMETER—Mason Standard,** best make; black oxidized brass scales, mounted on mahogany finish board, size 11x5 inches; scale range approximately 10–140° F. **5.00**

4088 4090 4096

4088. **HYGROMETER—Precision Hair,** more reliable and durable than the ordinary hair hygrometer. Metallic dial 13 cm. diameter, in lacquered brass case **11.00**

4090. **HYGROMETER—Mitthof,** metallic spiral in brass case, for direct reading of humidity.

Diameter, inches	3	4	5
Each	**3.00**	**10.00**	**15.00**

4092. **HYGROMETER—Weather Bureau pattern,** with two thermometers mounted on mahogany finish board 17x5 inches, nickel plated brass cistern, and certificates **13.50**

4096. **HYGROMETER—The Sling Psychrometer,** for obtaining quick and more accurate results than are possible with the stationary wet and dry bulb instruments. Scale 0–100° F. in ½°, with copper protecting case 16¾ inches long **11.50**

a. Extra Thermometers **4.00**

4100

4104

4108

4100. **INDUCTION COIL—Ruhmkorff,** with automatic break; best make, giving a heavy spark; mounted on polished mahogany base.

Length of spark, inches....	⅛	¼	½	1	2	3	4	6
Each	**5.50**	**6.50**	**11.50**	**22.00**	**42.00**	**65.00**	**105.00**	**130.00**

INK—Diamond, see No. 2590.

4104. **JAR—Anatomical,** with cover ground to the top of jar, and made air tight, by a rubber washer and clamp. On the under side of the lid, are two glass hooks to suspend the preparation.

Height without lid, inches	6	8	12		8	12	18
Diameter at mouth, inches	3½	3½	3½		5	5	5
Capacity, approximately; pints	1¾	2½	4	quarts	2¾	4	6
Each	**1.50**	**1.60**	**1.90**		**2.90**	**3.40**	**4.00**
Height without lid, inches	8	12	8	12	18	24	12
Diameter at mouth, inches	6¼	6¼	7⅝	7⅝	7⅝	7⅝	11½
Capacity, approximately; gallons...	1	1½	1½	2¼	3½	4½	4¾
Each	**3.75**	**4.10**	**5.70**	**6.50**	**7.75**	**9.00**	**14.00**

4108. **JAR—Battery, round,** of glass; best make.

Diameter, inches		4	4½	5	5	6	6
Height, inches		4	5	6	7	6	8
Each		**.55**	**.70**	**.90**	**1.10**	**1.20**	**1.40**
Diameter, inches	4	4	5	6	7	8½	9
Height, inches	10	13	9	9	9	12	12
Each	**1.30**	**1.40**	**1.35**	**1.60**	**1.75**	**2.60**	**3.40**

4109. **JAR—American Medical Museum,** wide top surface for tight sealings, heavy corners and edges, ground true on the bottom so that they stand firmly, with provision for supporting the specimens, true plane surfaces polished inside and outside. They are made of clear decolorized glass and are annealed until all internal strains are removed. *For cut, see next page.*

AMERICAN MEDICAL MUSEUM JARS, as above described:

Size No.	Dimensions in cm.	Number in barrel	Jars with covers per dozen
1	5 x 5 x 3	240	**7.56**
2	10 x 4½ x 3	180	**9.84**
3	15 x 8 x 5	48	**19.80**
4	15 x 15 x 9	24	**31.20**
5	16 x 10 x 8	36	**28.80**
6	20 x 8 x 4½	30	**31.20**
7	20 x 13 x 8	18	**36.00**
8	20 x 13 x 13	18	**45.00**
9	22 x 15 x 5½	18	**48.00**

4109

4112 4114

AMERICAN MEDICAL MUSEUM JARS—Continued.

4109/1. **SPECIMEN SUPPORT**—to fit No. 4109 Jars. For large, firm specimens where a frame is not necessary. Made of glass rod.

For Jars, size No.	1	2	3	4	5
Each	.10	.10	.10	.12	.10
Per dozen	1.00	1.00	1.00	1.25	1.00
For Jars, size No.		6	7	8	9
Each		.10	.12	.12	.12
Per dozen		1.00	1.25	1.25	1.25

4109/2. **SPECIMEN FRAME SUPPORT**—To fit No. 4109 Jars. For specimens that require stretching on a frame or support both at sides and top. Made of glass rod.

For Jars, size No.	1	2	3	4	5
Each	.30	.30	.30	.30	.30
Per dozen	3.25	3.25	3.25	3.25	3.25
For Jars, size No.		6	7	8	9
Each		.40	.40	.40	.50
Per dozen		4.30	4.30	4.30	5.40

4112. **JAR—Bell, or Bell glass,** tall form, with knob and ground flange.

Diameter inside, approx., inches	3	4	5	6	6½
Height inside; inches	6	8	9	11	14
Capacity, approx., gallons	⅛	¼	½	1	1½
Each	1.10	1.45	1.95	2.55	2.80
Diameter inside, approx., inches		7	8½	10	10
Height inside; inches		15	15	12	18
Capacity, approx., gallons		2	3	3	5
Each		3.45	4.40	10.00	12.60

4114. **JAR—Bell, open top,** narrow neck, with ground flange. Dimensions approximately same as above.

Capacity, gallons	⅛	¼	½	1	2	3	5
Each	1.10	1.45	1.95	2.55	3.45	4.40	12.60

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4116. **JAR—Bell, open top, wide neck,** with ground flange. Dimensions as 4112.

Capacity, gallons	⅛	¼	½	1	2	3	5
Each	**1.10**	**1.45**	**1.95**	**2.55**	**3.45**	**4.40**	**12.60**

Fitted with brass cap and stopcock; extra, according to size.

4118. **JAR, Bell, with ground glass stopper,** and ground flange. Dimensions as 4112.

Capacity, gallons	¼	½	1	2
Each	**1.70**	**2.10**	**2.65**	**3.45**

4120. **JAR—Bell, low form,** with knob and ground flange.

Height inside, approximately; inches	1½	2¼	3½	4	4½
Diameter inside, inches	3	4	5	6	7
Each	**.75**	**.85**	**1.25**	**1.80**	**2.10**
Height inside, approximately; inches	5	6	8	10	11
Diameter inside, inches	8	9	10	12	16
Each	**2.65**	**3.00**	**4.10**	**6.10**	**9.20**

4122. **JAR—Bell, open top,** with tubulature near bottom.

Height inside, inches	8	12
Diameter inside, inches	6	8
Each	**4.25**	**7.75**

4124. **Ditto**—without tubulature near bottom, each..... **3.75** **7.25**

4134

JAR—Calcium Chloride, see Tubes.

4130. **JAR—Decanting,** of acid proof stoneware, tubulated.

Cap., gals.	2½	5	8	10
Each	**6.00**	**8.00**	**10.25**	**12.00**

4132. **JAR—Expansion,** for testing the rising qualities of dough; graduated to 1000 cc. in 20 cc. divisions **2.75**

4136

4134. **JAR—Earthenware,** glazed, with cover and handle; used as slop jar in the laboratory.

Capacity, gallons	1	2	3	4	5	10
Each	**.80**	**1.20**	**1.80**	**2.20**	**2.80**	**6.25**

4136. **JAR—Glass,** with glass cover.

Capacity, ounces	½	1	2	4
Dozen	**1.50**	**1.80**	**2.20**	**2.60**

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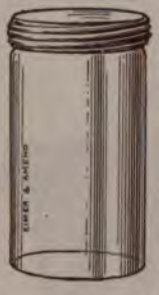
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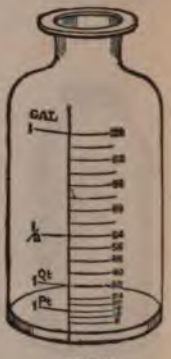

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4138. **JAR—Glass,** flint or colored glass, with aluminum cover.

Capacity, ounces	½	1	2	4	8	16
Dozen	**1.15**	**1.45**	**1.85**	**2.55**	**4.60**	**7.35**

4140. **JAR—Glass, round,** aluminum cap, cork lined.

Capacity, ounces	1	2	4	8	16
Dozen	**1.20**	**1.30**	**1.70**	**2.30**	**3.30**

4142. **JAR—Glass, square,** with aluminum cap, cork lined.

Capacity, ounces	1	2	4	8
Dozen	**1.20**	**1.25**	**1.65**	**2.25**

JAR—Hydrometer—see Cylinders.

4147. **JAR—Mason.**

Sizes	pint	quart	½ gallon
Price per dozen	**1.80**	**2.00**	**3.00**
Price per gross	**18.00**	**20.00**	**30.00**

4148. **JAR—Lightning,** of glass; with cover made air-tight by means of a rubber washer and wire clamp.

Capacity, ounces	11	16	32
Dozen	**1.80**	**2.40**	**3.00**

4150. **JAR—Precipitating,** heavy glass, with lip.

Capacity, pints	¼	½	1	2	gals.	½	1	2	3
Each	**.50**	**.55**	**.80**	**1.10**		**1.45**	**1.85**	**3.35**	**7.00**

4152 4154

4152. **JAR—Nessler,** superior quality, of colorless glass, with polished bottom; selected in sets of two or more agreeing.

Grad. at, cc.	50	100	50 & 100	50, 100 & 150
Each	**.65**	**.80**	**.90**	**1.10**
Per set of 6 to agree	**4.20**	**5.10**	**6.00**	**7.20**
Per set of 12 to agree	**9.00**	**10.80**	**12.60**	**15.00**

4154. **JAR—Nessler,** tall form.

Grad. at, cc.	50	100
Each	**.90**	**1.20**
Per set of 6 to agree	**6.00**	**7.80**
Per set of 12 to agree	**12.60**	**16.20**

4158

4156. **JAR—Percolating,** graduated in ounces.

Grad. to, gals.	¼	½	1	2
Each	**1.55**	**2.65**	**4.25**	**6.50**

4158. **JAR—Sample,** of glass, with rubber ring under cover, making the jar air-tight; convenient for samples, etc.

Capacity, qts.	1	2	4	8
Each	**.45**	**.75**	**1.75**	**2.75**

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JAR—Glass, with japanned tin cover.

Capacity, pints	½	1	2	gals. ½	1	2
Each	.25	.30	.40	.55	1.00	2.20

JAR—Specimen for microscopical, biological and museum purposes, glass, air-tight, with clamps.

Capacity, oz.	1½	4¾	8	9	14	23
Per dozen	2.40	2.60	3.20	3.50	4.50	6.30
Per gross	24.00	26.00	32.00	35.00	45.00	63.00

JAR—Specimen, with ground in glass stopper.

Dimensions, cm.	5x5	10x10	13x13
Each	1.35	2.00	3.00

JAR—Specimen-sectional, in three parts.

Height, inches	14½	14½
Diameter, inches	5½	6½
Each	2.25	2.50

JAR—Specimen, clearest flint glass, with mouth nearly as wide as the jar; well ground in glass stopper.

Height to top of stopper; in.	3½	4½	5½	6¾	5½	9	6¼	8¼
Diameter of body, inches	1½	1½	2	2	2½	2½	3	3
Capacity to neck, ounces	1½	2½	5	6	8	16	14	20
Each	.47	.50	.56	.65	.66	.84	.88	1.00
Dozen	4.75	5.00	5.65	6.50	6.60	8.40	8.75	10.00
Height to top of stopper, inches		10¼	8½	10½	7¾	10¾	14¾	13
Diameter of body, inches		3	3¾	3¾	4½	4½	4½	6
Capacity to neck, ounces		28	29	40	38	62	92	140
Each		1.16	1.30	1.60	1.65	2.00	2.40	3.75
Dozen		11.60	13.00	16.00	16.50	20.00	24.00	37.50

JAR—Specimen, inverted.

Capacity, pints	¼	½	1	2	gals. ½	1	2
Each	.27	.34	.44	.58	.88	1.75	2.65

JAR—Specimen, inverted, tube form; 5 inches high, 1 inch diameter ..... **dozen** **2.40**

JAR—Stock, japanned tin, with hinged cover; for storing crude chemicals.

Capacity, pounds	1	2	3	4
Dozen	3.55	5.10	6.30	7.75

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4174. **JAR—Stoneware, for storing chemicals, etc.,** wide mouth; glazed inside and outside, with ground stopper.

Capacity, gallons	½	1	2	3	5
Each	2.40	3.25	5.00	6.50	12.00

For additional Jars, see our Bacteriological Catalog, Sections I and II.

4176. **KETTLE—Agateware,** for evaporation.

Capacity, gallons	½	¾	1	2	3	7½
Diameter, inches	7	8½	9½	11¼	13	17⅝
Each	.60	.75	.90	1.25	1.75	4.75

4177. **KETTLE**—like No. 4176, but of **Aluminum.**

Capacity, quarts	2	3	4	8	12
Diameter outside, inches	7¾	8 9/16	9 7/16	11 7/16	12 11/16
Each	1.65	2.20	2.45	3.30	5.00

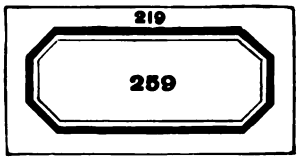
4178. **KETTLE—Amalgam,** of iron, porcelain lined, with spout.

Capacity, gallons	½	1	2
Each	1.00	1.20	2.20

KJELDAHL APPARATUS—See **Nitrogen Determination Apparatus.**

4180. **KNIFE**—For cutting glass (see also glass cutters) **1.25**

4182. **KNIFE**—For cutting corks, etc. ..... **.25**



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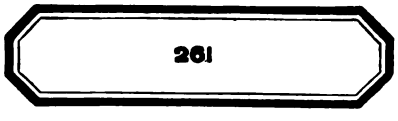

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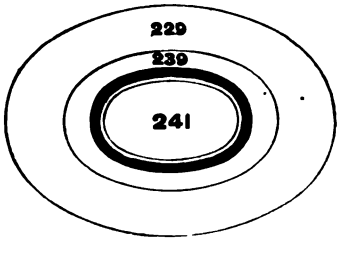

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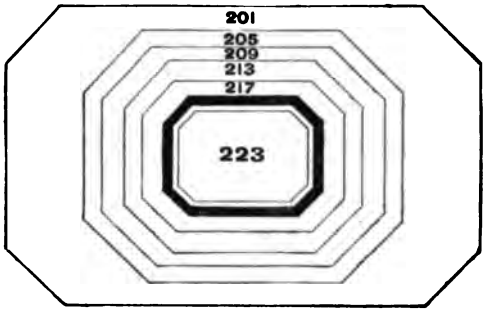


4184

4184. **LABELS—Gummed paper,** red border.

No.	201	205	209	213	217	219
Per box	.10	.10	.10	.10	.10	.10
Dozen boxes	1.00	1.00	1.00	1.00	1.00	1.00
No.	223	229	239	241	259	261
Per box	.10	.10	.10	.10	.10	.10
Dozen boxes	1.00	1.00	1.00	1.00	1.00	1.00
No.	2004	2007	2002	2001	2005	2003
Size, inches	2¾x1	2⅞x1⅝	3⅞x1	3⅞x1½	4x1⅞	4¾x2
Per box	.20	.25	.25	.30	.35	.45
Dozen boxes	2.00	2.50	2.50	3.00	3.50	4.50

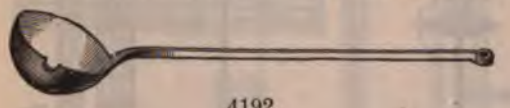
4186. **LABEL BOOK**—Labels No. 4184, perforated, in books, non-blocking gum being used, the possibility of the labels sticking together is eliminated ..... **.35**

4188. **LABEL BOOK**—Containing the names of the mostly used chemicals and reagents, with name and formula. The labels are gummed and perforated, and can be easily removed ..... **per book .40**

4190. **LABELS**—Consecutive numbers, gummed and perforated; in sheets, ¼ inch figures; 1 to 1000, 200 on a sheet ..... **per 1000 numbers .50**

4191. **LABELS—Ear Tags,** of aluminum with staples, serially numbered ..... **per 100 3.50**
per 500 15.75
per 1000 23.50

LACTOMETERS—See **Hydrometers for Milk.**



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4192. **LADLE—Iron,** with pouring lip; for molten metals, etc.

Diameter, inches	2½	3	4	6
Each	.60	.75	1.00	1.75

4194. **LADLE—Cast iron,** with detachable handle which can be removed while ladle is on the fire.

Size, inches	4x2⅜	4⅜x2½	4½x2¾
With handle	1.60	1.65	1.70

4198. **LAMP—Inverted Incandescent,** with white opaline glass globe, of high heat resisting and light diffusive properties; complete with burner and by pass **4.20**

4200. **LAMP—The Dome Light,** with incandescent mantle burner, cylinder and green plated shade **3.00**

4202. **LAMP—Student,** nickel plated, with chimney and shade 7 inches diameter; complete, mounted with reservoir **10.00**

4204

4204. **LAMP—Davy, Safety;** or miner's lamp **4.50**

LAMP—Alcohol, see Burners.

LAMP—Blast, see Burners.

LAMP—Blowpipe, see Blowpipe Apparatus.

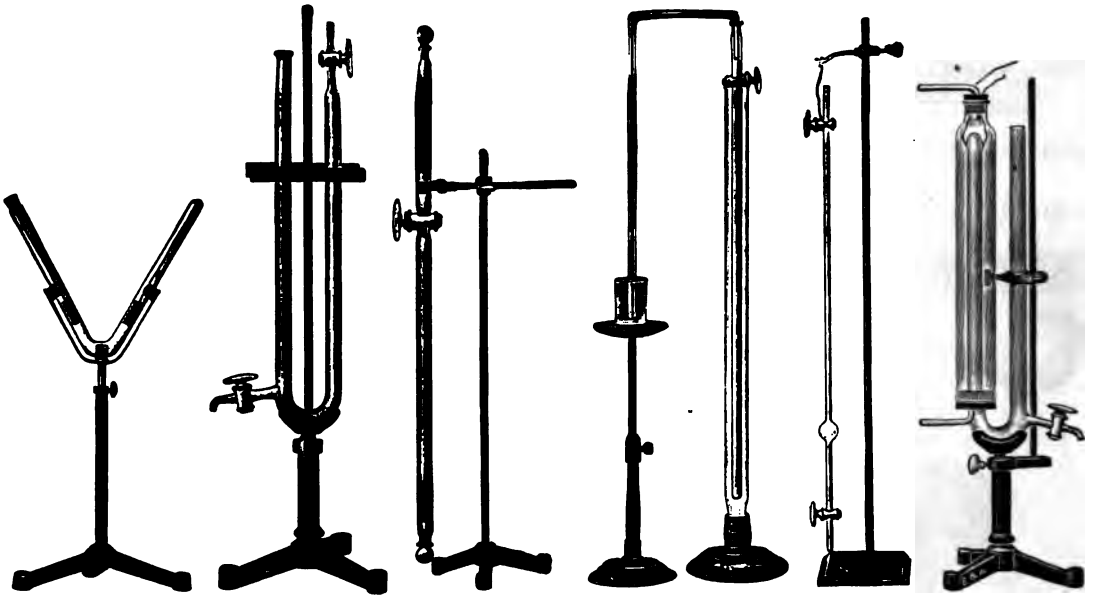
LAMP—Polariscope, see Polariscopes.

4206. **LAMP—Parting,** for alcohol. Of galvanized iron, for use with flasks; hood and pipe attached for carrying off fumes.

With lamps	6	12
Each	7.90	11.40

4207. **Ditto**—Same as above, with upper shelf perforated for holding test tubes, but without hood and pipe.

With lamps	6	12
Each	6.20	9.65



4208 4212–16 4220 4224 4226 4230

Lecture Apparatus

4208. **HOFFMAN APPARATUS**—For electrolysis of hydrochloric acid, water, and ammonia; with platinum electrodes; complete on support **15.00**

4210. **Glass parts only** for above **12.00**

4212. **HOFFMAN APPARATUS**—For determining the volume of hydrogen in hydrochloric acid with two stopcocks; on support **10.00**

4214. **Glass parts only** for above **6.00**

4216. **HOFFMAN APPARATUS**—For demonstrating that 3 vols. of hydrogen and 1 vol. of nitrogen combine to form 2 vols. of Ammonia; also that hydrogen and oxygen are combined in the same proportion as they are liberated from water by electrolysis; with platinum electrodes and two stopcocks, on support. The tube is the same as No. 4212, but with platinum electrodes **13.50**

4218. **Glass parts only** for above **8.50**

4220. **HOFFMAN APPARATUS**—For demonstrating the invariable composition of hydrochloric acid; stoppered tube with stopcock; with support **6.85**

4222. **Glass parts only** for above **5.00**

4224. **HOFFMAN APPARATUS**—To demonstrate that Ammonia consists of 3 vols. hydrogen and 1 vol. nitrogen. The tube with stopcock, rubber tubing and connecting tubing.. **7.50**
The cylinder and support table ..... **extra 8.00**

4226. **HOFFMAN APPARATUS**—For demonstrating that 1 vol. of hydrogen, and 1 vol. of chlorine combine to form 2 vols. of hydrochloric acid, without change in volume; tube with two stopcocks, and support **6.50**

4228. **Glass parts only** for above **4.50**

4230. **HOFFMAN APPARATUS**—For demonstrating that by combining hydrogen and oxygen into water, a condensation of one-third takes place. The tube, complete with jacket and support **12.00**

4232. **Glass parts only** for above **9.00**

4234. **HOFFMAN APPARATUS**—For decomposition of water showing that water consists of 2 vols. hydrogen and 1 vol. oxygen. The tube, **ungraduated**, with two stopcocks and platinum electrodes (cut same as 4238, without stopcock) without support **16.00**

4236. **The tube** for above with **graduated** limbs, and platinum electrodes; without support ... **17.00**

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4258

4238. **HOFFMAN APPARATUS**—The tube for 4234 with graduated limbs, platinum electrodes, and **stopcock below**; without support **18.50**

4240. **The Support** for 4234, with binding screws for the poles ..... **extra 3.00**

4242. **LECTURE APPARATUS—McFarland Voltameter,** with platinum electrodes; mounted on support with binding posts **14.00**

4244. **HOFFMAN APPARATUS**—For electrolysis of water, hydrochloric acid and ammonia; tube with platinum electrodes, and support with binding screws for the poles **18.00**

4246. **Glass parts only** for above **15.00**

4248. **HOFFMAN APPARATUS**—Tube, with carbon electrodes; support as above **15.00**

4249. **Glass parts only** for 4248 ..... **12.00**

4250. **HOFFMAN APPARATUS**—To demonstrate that oxygen and hydrogen are combined in the same proportion as they are liberated from water by electrolysis; tube with glass stopcocks, platinum electrodes, and support **11.50**

4252. **Glass parts only** for above **7.50**

4254. **HOFFMAN APPARATUS**—Tube, **graduated,** with platinum electrodes, and support as 4250 ..... **14.00**

4256. **Glass parts only** for 4254 ..... **10.00**

4258. **HOFFMAN APPARATUS**—To demonstrate that oxygen has the same volume as the carbonic acid or sulfurous acid produced from it. Tube as illustrated, with support **16.00**

4260. **Glass parts only** for above **12.00**

4262. **LECTURE APPARATUS—Hulett,** to demonstrate the volumetric composition of water vapor. Designed to overcome the difficulties in performing the experiment as usually carried out. The Eudiometer, graduated, with glass jacket and levelling bulb only **17.00**

a. The gas generator and platinum electrode **9.00**

b. The three-way stopcock **4.00**

c. The support **2.50**

4264. **HOFFMAN APPARATUS**—For electrolysis of water, collecting the gases separately in graduated tubes **7.50**

4266. **Ditto**—on glass foot **8.00**

4268. **LECTURE APPARATUS—Griffin,** for the electrolytic decomposition of water, plain tubes; mounted on wooden stand with terminals **16.00**

4270

4272

4274

4276

4270. **LENS—Magnifying,** folding; in vulcanite mounting.

With glasses	1	2	3
Each	.95	1.35	2.00

4272. **LENS—Magnifying,** folding; in nickel plated case.

With glasses	1	2
Each	1.80	2.25

4274. **LENS—Magnifying, Coddington,** very powerful; in nickel plated folding case.

Diameter, mm.	10	15	20	25	30
Each	1.25	1.50	1.75	2.25	2.50

4276. **LENS—Magnifying, Coddington,** very powerful; in brass frame with handle; small size, ½ inch **2.00**

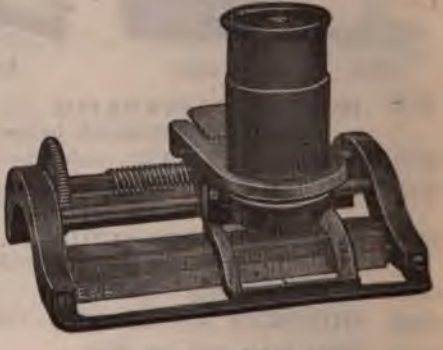
4278. **Ditto**—large size, 1 inch **2.50**

4280

4282

4283–4283/1

4283/2



4281

4280. **LENS—Magnifying, thread counter;** in brass mount.

Diameter, open square; inches	¼ x ½	1
Each	1.00	4.50

4281. **LENS—Thread Counting Micrometer,** combines accuracy, speed and ease **20.00**

It has five scales as follows:

Inch–divided in ¼.
(10) Decimal inch–divided in 1/10.
(L) Linen measure.
(MM) French millimeter.
(F) French Lignes.

Used extensively in cotton goods, silk and other textile trades.

4282. **LENS—Magnifying,** mounted in brass frame with legs and adjusting screw for focusing **.90**

4283. **LENS—Magnifying,** Watchmakers', in horn mounting, diameter 27 mm. ..... **.95**

4283/1. **LENS—Magnifying,** Watchmakers', fitted with two lenses, one removable, giving two different focal lengths and magnifications **1.35**

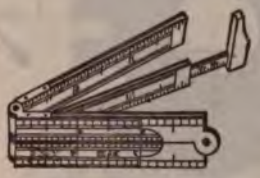
4283/2. **LENS—Magnifying,** Engravers', consisting of two plano-convex lenses, 40 mm. dia. in vulcanite mounting. Also used for counting bacteria in milk **4.00**

4284

4286

4292

4294


4300

4316

4302

4313

4284. **LENS—Magnifying, reading glass,** in nickel plated frame, with wooden handle.

Diameter of glass, inches	2	2½	3	3½	4
Each	1.60	1.90	2.15	2.70	3.35

LENS—Index Magnifying, for use with **Balance,** see No. 452.

LENS PAPER—see **Paper.**

LETTERS—Steel, see **Dies.**

4286. **LEVEL—Spirit,** mounted in brass frame; length 4 inches ..... **.80**

4288. **Ditto**—length 6 inches **1.10**

4290. **LEVEL—Spirit, circular,** in brass frame; diameter 1 inch **6.00**

LEYDEN JARS—See Jars.

4292. **MAGNET—Bar,** best polished steel.

Length, inches	4	6	8	10
Each	.35	.90	1.50	2.00

4294. **MAGNET—Horseshoe,** best English steel.

Length, inches	2	3	4	6	8	10	12
Each	.30	.40	.70	1.50	3.20	4.00	6.00

MANOMETERS—See **Gauges.**

MASKS—See **Respirators.**

4296. **MEASURE—Hardwood,** 12 inches long, graduated one side 30 cm. in mm., and inches in ⅛th on the other side ..... each **.20**
dozen **2.00**

4298. **MEASURE—Hardwood, meter stick,** graduated one side in mm., inches and fractions on the other side ..... **.60**

4300. **MEASURE—Folding,** graduated one side inches and fractions, other side in mm., with caliper extension of brass; of hardwood, with brass mountings ..... **.95**

4302. **MEASURE—Micrometer Screw Gauge,** graduated to read down to 1/1000th inch **11.00**

4304. **Ditto**—in case **12.00**

4306. **MEASURE—Micrometer Screw Gauge,** graduated to read to hundredths of a mm... **11.00**

4308. **Ditto**—in case **12.00**

4313. **MEASURE—Bernier Calipers,** steel, length over 16 cm., graduated to 5 inches in 1/16 inch, and to 12 cm. in mm., reading by vernier to 1/128 inch, and to 1/10 mm.... **4.50**

4316. **MEASURE—Self-Registering,** for taking inside and outside measurements of glass tubing, etc.

Size of opening; inches	3	5	6
Each	1.70	1.10	1.30

4322 4324 4326 4330

4318 4332 4334 4336 4338

4318. **MEASURE—Inside Caliper,** a conical steel blade, nickel plated; graduated on the edge and reading 1/10th mm.; for accurately measuring the bore of glass tubing, etc. From 1 to 15 mm. **1.50**

4320. **Ditto**—from 15 to 30 mm. **2.25**

4322. **MEASURE—American Standard gauge, for wire** **3.50**

4324. **MEASURING TAPE**—Steel, graduated in inches and centimeters; in nickel silver case.

Length, feet	3	6	12
Each	**1.40**	**2.10**	**4.00**

4326. **MEASURE—Agateware,** for liquids.

Capacity, pints	¼	½	1	2	4	8
Each	**.40**	**.45**	**.60**	**.80**	**1.10**	**1.50**

4328. **MEASURE—Copper.**

Capacity, pints	¼	½	1	2	4	8
Each	**1.05**	**1.25**	**1.60**	**2.10**	**3.00**	**4.50**

4330. **MEASURE—Tin.**

Capacity, pints	¼	½	1	2	4	8
Each	**.15**	**.20**	**.30**	**.35**	**.55**	**.75**

MEDICINE DROPPER—See **Pipettes.**

4332. **MELTING POINT APPARATUS.**

Capacity, cc.	150	250	500
Each	**3.50**	**4.00**	**4.50**

4334. **MELTING POINT APPARATUS—Roth,** capacity 250 cc. **3.25**

4336. **MELTING POINT TUBE—Thiele,** of Pyrex glass **1.25**

4338. **METRONOME**—For counting seconds and fractional parts of a second; best make, in well finished case. Used by many chemists in preference to a stopwatch, for viscosity determinations, etc. **6.00**

Microscopes

We stock a full assortment of the **Bausch & Lomb** and **Spencer Lens Co.**, microscopes and accessories. We list in this catalog the instruments in more general use. For a more complete assortment and **additional details,** see **Bacteriological Catalog,** Section I.

4339

4341/1

4339. **BAUSCH & Lomb Microscope A**—is the least expensive compound microscope made, for children who are interested in Microscopy, for examining insects, powders, paper for botanical purposes, etc. **31.50**

It has dry objectives, divisible, 16+32, and 7.5x eyepiece.

4341. **BAUSCH & LOMB MICROSCOPE F**—is the cheapest model of this widely-known line having both coarse and fine adjustments. The fine adjustment is of the lever type; it ceases to act when the objective touches the slide. The long curved arm permits the use of a large stage, 102 x 102 mm., providing a working distance of 76 mm. from optical center to arm at stage surface. The stage is provided with an iris diaphragm controlled by a milled ring, and having screw threads for attaching a sub-stage ring to hold an Abbe condenser.

Outfit No.	Objectives Dry	Eye Pieces	Nose Pieces	Price
F 1	16 mm 4 mm	7.5x	.....	**54.00**
F 2	16 mm 4 mm	7.5x	Circular Double	**60.50**
F 3	16 mm 4 mm	5x 10x	.....	**56.50**
F 4	16 mm 4 mm	5x 10x	Circular Double	**63.00**

4341/1. **MODEL FF**—(illustrated above) is similar to Model F, excepting that it has also a sub-stage, condenser, oil immersion objective, and circular *triple* nose-piece.

Outfit No.	Objectives Dry	Objectives Oil Immersion	Eye Pieces	Nose Pieces	Abbe Condenser	Price
FF 8	16 mm 4 mm	1.9 mm 1.30 N.A.	5x 10x	Circular Triple	1.20 N.A.	**128.50**
FF 10	16 mm 4 mm	1.9 mm 1.32 N.A.	5x 10x	Circular Triple	1.20 N.A.	**164.50**

4343

4343/1

4343. **BAUSCH & LOMB MICROSCOPE FS**—has the same general specifications as the Model F (No. 4341). It has, however, the *side* fine adjustment of the lever type, with micrometer head on each side of arm, one complete revolution of the micrometer heads producing a vertical movement of 0.25 mm. Automatic take-up for wear is provided.

Outfit No.	Objectives Dry	Eye Pieces	Nose Pieces	Price
FS 1	16 mm 4 mm	7.5x	.....	**57.50**
FS 2	16 mm 4 mm	7.5x	Circular Double	**64.00**
FS 3	16 mm 4 mm	5x 10x	.....	**60.00**
FS 4	16 mm 4 mm	5x 10x	Circular Double	**66.50**

4343/1. **MODEL FFS**—(illustrated above) is similar to the Model FS, excepting that it has also a sub-stage, condenser, oil-immersion objective, and circular *triple* nose-piece. Swing-out condenser may be substituted for the regular at a slight additional cost.

Outfit No.	Objectives Dry	Objectives Oil Immersion	Eye Pieces	Nose Pieces	Abbe Condenser	Price
FFS 8	16 mm 4 mm	1.9 mm 1.30 N.A.	5x 10x	Circular Triple	1.20 N.A.	**132.00**
FFS 10	16 mm 4 mm	1.9 mm 1.32 N.A.	5x 10x	Circular Triple	1.20 N.A.	**168.00**

Sub-stage equipped with swing-out condenser .....**extra 8.75**

4345

4347

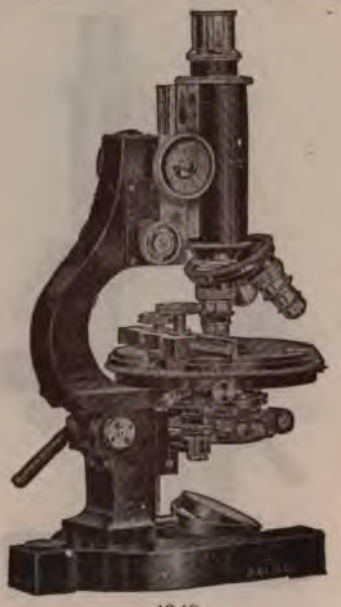
4345. **BAUSCH & LOMB MISCROSCOPE CAS**—The pillar, rectangular in section, has a double-bearing inclination joint with clamping lever to secure the instrument in any position.

The side fine adjustment is of the standard lever type, one complete revolution of the micrometer heads producing .125 mm. vertical travel, each graduation indicating a movement of 2.5 microns.

Outfit No.	Objectives		Eye Pieces	Nose Pieces	Abbe Condenser	Price
	Dry	Oil Immersion				
	Achromatic		*Huyghenian*			
CAS 1	16 mm 4 mm	.....	7.5x	.....	1.20 N.A.	**138.50**
CAS 2	16 mm 4 mm	.....	7.5x	Circular Double	1.20 N.A.	**145.00**
CAS 3	16 mm 4 mm	.....	5x 10x	.....	1.20 N.A.	**141.00**
CAS 4	16 mm 4 mm	.....	5x 10x	Circular Double	1.20 N.A.	**147.50**
CAS 8	16 mm 4 mm	1.9 mm 1.30 N.A.	5x 10x	Circular Triple	1.20 N.A.	**192.00**
CAS 10	16 mm 4 mm	1.9 mm 1.32 N.A.	5x 10x	Circular Triple	1.20 N.A.	**228.00**
	Apochromatic		*Compensating*			
CAS 14	16 mm 4 mm	.....	7.5x 12.5x	Circular Double	1.40 N.A.	**241.50**
CAS 18	16 mm 4 mm	2 mm 1.30 N.A.	7.5x 12.5x	Circular Triple	1.40 N.A.	**376.00**

4347. **BAUSCH & LOMB MICROSCOPE CCS**—Similar to above but with circular revolving stage, instead of rectangular.

Outfit No.	Objectives		Eye Pieces	Nose Pieces	Abbe Condenser	Price
	Dry	Oil Immersion				
	Achromatic		*Huyghenian*			
CCS 1	16 mm 4 mm	.....	7.5x	.....	1.20 N.A.	**156.50**
CCS 2	16 mm 4 mm	.....	7.5x	Circular Double	1.20 N.A.	**163.00**
CCS 3	16 mm 4 mm	.....	5x 10x	.....	1.20 N.A.	**159.00**
CCS 4	16 mm 4 mm	.....	5x 10x	Circular Double	1.20 N.A.	**165.50**
CCS 8	16 mm 4 mm	1.9 mm 1.30 N.A.	5x 10x	Circular Triple	1.20 N.A.	**210.00**
CCS 10	16 mm 4 mm	1.9 mm 1.32 N.A.	5x 10x	Circular Triple	1.20 N.A.	**246.00**
	Apochromatic		*Compensating*			
CCS 14	16 mm 4 mm	.....	7.5x 12.5x	Circular Double	1.40 N.A.	**259.50**
CCS 18	16 mm 4 mm	2 mm 1.30 N.A.	7.5x 12.5x	Circular Triple	1.40 N.A.	**394.00**



4349

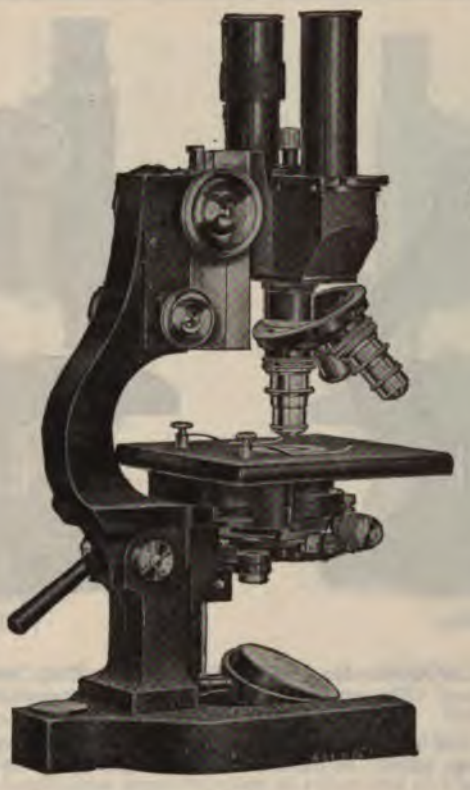
4351

4349. **BAUSCH & LOMB MICROSCOPE CDS**—Similar to No. 4345, but with mechanical stage 125 mm. diameter.

Outfit No.	Objectives		Eye Pieces	Nose Pieces	Abbe Condenser	Price
	Dry	Oil Immersion				
	Achromatic		*Huyghenian*			
CDS 1	16 mm 4 mm	.....	7.5x	.....	1.20 N.A.	**198.50**
CDS 2	16 mm 4 mm	.....	7.5x	Circular Double	1.20 N.A.	**205.00**
CDS 3	16 mm 4 mm	.....	5x 10x	.....	1.20 N.A.	**201.00**
CDS 4	16 mm 4 mm	.....	5x 10x	Circular Double	1.20 N.A.	**207.50**
CDS 8	16 mm 4 mm	1.9 mm 1.32 N.A.	5x 10x	Circular Triple	1.20 N.A.	**252.00**
CDS 10	16 mm 4 mm	1.9 mm 1.32 N.A.	5x 10x	Circular Triple	1.20 N.A.	**288.00**
	Apochromatic		*Compensating*			
CDS 14	16 mm 4 mm	.....	7.5x 12.5x	Circular Double	1.40 N.A.	**301.50**
CDS 18	16 mm 4 mm	2 mm 1.30 N.A.	7.5x 12.5x	Circular Triple	1.40 N.A.	**436.00**
.....	Plain Stage for CDS, vulcanite covered					**21.00**

4351. **BAUSCH & LOMB MICROSCOPE DDS**—Similar to No. 4349, but having a body tube 50 mm. diameter for photomicrographic work. Micro-Tessar photographic objective.

Outfit No.	Objectives		Eye Pieces	Nose Pieces	Abbe Condenser	Price
	Dry	Oil Immersion				
	Achromatic		*Huyghenian*			
DDS 1	16 mm 4 mm	.....	7.5x	.....	1.20 N.A.	**216.50**
DDS 2	16 mm 4 mm	.....	7.5x	Circular Double	1.20 N.A.	**223.00**
DDS 3	16 mm 4 mm	.....	5x 10x	.....	1.20 N.A.	**219.00**
DDS 4	16 mm 4 mm	.....	5x 10x	Circular Double	1.20 N.A.	**225.50**
DDS 8	16 mm 4 mm	1.9 mm	5x 10x	Circular Triple	1.20 N.A.	**270.00**
DDS 10	16 mm 4 mm	1.9 mm 1.32 N.A.	5x 10x	Circular Triple	1.20 N.A.	**306.00**
	Apochromatic		*Compensating*			
DDS 14	16 mm 4 mm	.....	7.5x 12.5x	Circular Double	1.40 N.A.	**319.50**
DDS 18	16 mm 4 mm	2 mm 1.30 N.A.	7.5x 12.5x	Circular Triple	1.40 N.A	**454.00**
.....	Plain Stage for DDS, vulcanite covered					**21.00**



4353

4353. **BAUSCH & LOMB BINOCULAR MICROSCOPE CAE** (for single objectives).—This is a new model binocular microscope of the parallel tube type, using the regular optics of all powers, including oil immersion objectives. The stand has a complete substage with all facilities for advanced work.

The body tube has a special prism system in case fitted with two parallel eyepiece tubes; separation of tubes is varied by a milled head placed between them and the interpupillary distance indicated on a millimeter scale; one tube has spiral adjustment for correcting differences in vision existing between the eyes of the observer; prism base has society screw thread to take any microscope objective.

It is fitted with the side fine adjustment of lever type with micrometer head on either side of arm—one with drum graduated to read 2.5 microns of vertical movement; complete rotation of micrometer heads produces vertical movement of 0.125 mm. always in same direction as coarse adjustment heads; fine adjustment ceases to operate when objective touches slide; positive stops denote upper and lower limits; automatic take-up for wear is provided, and all parts of fine adjustment are dust-proof. It has a complete substage with swing-out condenser.

Outfit No.	Objectives		Eye Pieces	Nose Pieces	Abbe Condenser	Price
	Dry	Oil Immersion				
	Achromatic		*Huyghenian*			
CAE 1	16 mm 4 mm	.....	7.5x	.....	1.20 N.A.	**214.00**
CAE 2	16 mm 4 mm	.....	7.5x	Circular Double	1.20 N.A.	**220.50**
CAE 3	16 mm 4 mm	.....	5x 10x	.....	1.20 N.A.	**219.00**
CAE 4	16 mm 4 mm	.....	5x 10x	Circular Double	1.20 N.A.	**225.50**
CAE 8	16 mm 4 mm	1.9 mm 1.30 N.A.	5x 10x	Circular Triple	1.20 N.A.	**270.00**
CAE 10	16 mm 4 mm	1.9 mm 1.32 N.A.	5x 10x	Circular Triple	1.20 N.A.	**306.00**
	Apochromatic		*Compensating*			
CAE 14	16 mm 4 mm	.....	7.5x 12.5x	Circular Double	1.20 N.A.	**337.50**
CAE 18	16 mm 4 mm	2 mm 1.30 N.A.	7.5x 12.5x	Circular Triple	1.20 N.A.	**472.00**

For other Binoculars, see Nos. 4363–4365/5.

4355

4355/7

4355. **SPENCER MICROSCOPE No. 64**—This is an excellent instrument for Botanical and Biological use. The arm is fitted with side fine adjustment identical with microscope No. 4357.

The stage is 112 x 108 mm. and is covered with vulcanite rubber vulcanized directly to the stage plate. It has an iris diaphragm operated by a knurled wheel 62 mm. in diameter.

An Abbe condenser is supplied when ordered, and is fitted in a simple spiral focusing ring.

Outfit No.	Abbe Condenser	Nose piece	Achromatic Objectives Equiv. Foc. mm.	Huyghenian Oculars	Price
64A	.....	.....	16, 4	10x	**57.50**
64B	.....	Double	16, 4	10x	**64.00**
64C	.....	.....	16, 4	6x, 10x	**60.00**
64D	.....	Double	16, 4	6x, 10x	**66.50**
64E	N.A. 1.20	Double	16, 4	10x	**76.00**
64F	N.A. 1.20	Double	16, 4	6x, 10x	**78.50**

4355/1. **SPENCER MICROSCOPE No. 65**—is same as above, excepting that it has a lever type fine adjustment. Prices slightly lower than No. 4355.

4355/7. **SPENCER MICROSCOPE No. 74**—This is an inexpensive instrument, where only low power is required. It is used for elementary school purposes, also for examining drugs, starches, minerals and paper; for magnification (see below).

The microscope has only a coarse adjustment, as for low power the fine adjustment is not required.

The stage is 112 x 108 mm., made of metal plate covered with heavy durable lacquer.

The divisible objective, 32–14 mm., gives with 6x ocular, magnifications of 17 and 65 diameters; with the 10x ocular, 35 and 130 diameters.

Outfit No.	Nosepiece	Achromatic Objectives Equiv. Focus Mm.	Huyghenian Oculars	Price
74X	.....	Divisible 32–14	10x	**31.50**
74Y	.....	Divisible 32–14	.....	**42.50**
		Special 5	6x, 10x	
74Z	Double	Divisible 32–14	.....	**49.50**
		Special 5	6x, 10x	

4357

4357/1

4357. **SPENCER MICROSCOPE No. 44**—This is the most popular of all Spencer Microscopes. Many hundreds of this particular type are used by physicians in the hospitals and in general laboratories.

The arm is strong and fitted with a special fine adjustment possessing many exclusive and patented features. There are but two bearing surfaces and three working parts. Steel heads form sensitive stops at either end of the excursion. One revolution moves the body tube .2 mm.

The stage is 112 x 108 mm. and is fitted with quick screw substage.

Outfit No.	Abbe Condenser	Nose-piece	Achromatic Objectives Equiv. Foc. mm.	Huyghenian Oculars	Price
44A	.....	.....	16, 4	10x	**66.50**
44B	.....	Double	16, 4	10x	**73.00**
44C	.....	.....	16, 4	6x, 10x	**69.00**
44D	.....	Double	16, 4	6x, 10x	**75.50**
44E	N.A. 1.20	Double	16, 4	10x	**85.00**
44F	N.A. 1.20	Double	16, 4	6x, 10x	**87.50**
44H	N.A. 1.20	Triple	16, 4, 1.8 Oil imm.	6x, 10x	**132.00**

4357/1. **SPENCER MICROSCOPE No. 45**—is similar to above, excepting that it is fitted with "lever type" fine adjustment on top of the arm. One revolution of the fine adjustment head moves the tube .5 mm. It is the lowest priced outfit for the university and college laboratory, and is a thoroughly dependable microscope. The stage is 112 x 108 mm. The substage is of the standard quick screw form.

Outfit No.	Abbe Condenser	Nose-piece	Achromatic Objectives Equiv. Foc. mm.	Huyghenian Oculars	Price
45A	.....	.....	16, 4	10x	**63.00**
45B	.....	Double	16, 4	10x	**69.50**
45C	.....	.....	16, 4	6x, 10x	**65.50**
45D	.....	Double	16, 4	6x, 10x	**72.00**
45E	N.A. 1.20	Double	16, 4	10x	**81.50**
45F	N.A. 1.20	Double	16, 4	6x, 10x	**84.00**
45H	N.A. 1.20	Triple	16, 4, 1.8 Oil imm.	6x, 10x	**128.50**

Above outfits can be supplied with round revolving stage (**15.00 extra**), also with revolving mechanical stage (**35.00 extra**), and down swing condenser (**9.00 extra**).

4359

4359/1

4359. **SPENCER MICROSCOPE No. 10**—This is a photo-micrographic Stand used by scientists and Research laboratories.

The body tube is 50 mm. in diameter, and arranged for standard objectives, and oculars It is fitted with side fine adjustment, with which one complete revolution gives an up-or-down movement of .1 mm., the graduations reading to single microns. The distance from the optical center of stage to the arm is 100 mm.

Outfit No.	Wide Angle Condenser	Nose-piece	Objectives Equiv. Foc. mm.	Apochromatic Outfits		Achromatic Outfits	
				Com-pens. Oculars	Price	Huyghe-nian Oculars	Price
10A	N.A. 1.40	.....	16, 4	10x	**300.50**	10x	**216.50**
10E	N.A. 1.40	Double	16, 4	10x	**307.00**	10x	**223.00**
10C	N.A. 1.40	.....	16, 4	10x, 15x	**313.50**	6x, 10x	**219.00**
10F	N.A 1.40	Double	16, 4	10x, 15x	**320.00**	6x, 10x	**225.50**
10H	N.A. 1.40	Triple	16, 4, 1.8 * Oil imm.	10x, 15x	**454.50**	6x, 10x	**270.00**

4359/1. **SPENCER MICROSCOPE No. 15**—This is a high grade instrument for general research work. It is similar in general construction to microscope stand No. 10.

The revolving mechanical stage "two stages in one" is 120 mm. diameter, and can be centered by means of centering screws. The distance from optical center to arm is 90 mm. Complete rack and pinion substage with condenser N.A. 1.40 is supplied.

Outfit No.	Wide Angle Condenser	Nose-piece	Objectives Equiv. Foc. mm.	Apochromatic Outfits		Achromatic Outfits	
				Com-pens. Oculars	Price	Huyghe-nian Oculars	Price
15A	N.A. 1.40	.....	16, 4	10x	**275.50**	10x	**191.50**
15E	N.A. 1.40	Double	16, 4	10x	**282.00**	10x	**198.00**
15C	N.A. 1.40	.....	16, 4	10x, 15x	**288.50**	6x, 10x	**194.00**
15F	N.A. 1.40	Double	16, 4	10x, 15x	**295.00**	6x, 10x	**200.50**
15H	N.A. 1.40	Triple	16, 4, 1.8 * Oil imm.	10x, 15x	**429.50**	6x, 10x	**245.00**

* Apochromatic has 2 mm. Oil imm.

4359/2

4361
In carrying case

4361

359/2. **SPENCER MICROSCOPE No. 24**—A new model microscope designed for photo-micrographic work. It has the large body tube, 50 mm. diameter for photo-micro work, the society screw for the standard objectives, and accommodates standard oculars. The arm is made so it can be carried without injuring the fine adjustment, and the microscope has the side fine adjustment in which there is no lost motion. The circular revolving stage is 120 mm. diameter with the edge neatly milled The distance from optical axis to arm is 90 mm. It is fitted with a quick screw substage, and centering condenser.

Outfit No.	Abbe Condenser	Nose-piece	Achromatic Objectives Equiv. Foc. mm.	Huyghenian Oculars	Price
24A	.....	.....	16, 4	10x	**114.50**
24B	.....	Double	16, 4	10x	**121.00**
24C	.....	.....	16, 4	6x, 10x	**117.00**
24D	.....	Double	16, 4	6x, 10x	**123.50**
24E	N.A. 1.20	Double	16, 4	10x	**133.00**
24F	N.A. 1.20	Double	16, 4	6x, 10x	**135.50**
24H	N.A. 1.20	Triple	16, 4, 1.8 Oil imm.	6x, 10x	**180.00**

Substitution can be made of Revolving Mechanical Stage (120 mm. diameter), "two stages in one," identical with that supplied on Microscope No. 4359/1.

SPENCER PORTABLE MICROSCOPE No. 60—A traveling microscope, the most portable made. Weight 9½ lbs.

The objectives are specially mounted in short mounts with special protecting metal caps. The stage 88 x 110 mm is covered with vulcanite. It does not fold or turn.

The case measures 8¾ x 6½ x 3¾" outside dimensions and is made of Magnalium metal.

Outfit No.	Abbe Condenser	Nose-piece	Achromatic Objectives Equiv. Foc. mm.	Huyghenian Oculars	Price
60B	.....	Double	16, 4	10x	**111.00**
60D	.....	Double	16, 4	6x, 10x	**113.50**
60E	N.A. 1.20	Double	16, 4	10x	**123.00**
60F	N.A. 1.20	Double	16, 4	6x, 10x	**125.50**
60H	N.A. 1.20	Triple	16, 4, 1.8 Oil imm.	6x, 10x	**170.00**

4363

4363. SPENCER MON-OBJECTIVE BINOCULAR MICROSCOPE No. 2—The latest development, and one of the most desirable microscopes for the research worker or anyone using the microscope for long periods of time.

Any standard microscope objective, from the lowest to the highest power oil immersion objective, may be used.

Both eyes are used at all times. The oculars are separated by simply turning a knurled ring on the right-hand tube which is the most convenient position possible. This is a horizontal sliding movement and accommodates any pupillary distance from 50 to 75 mm. Between these two extremes the optical tube length is changed a total of 13 mm. or less than 7 mm. either side of the 160 mm. tube length (obtained at a pupillary distance of 62 mm which is about the average), and the change involved in accommodating the ordinary range in pupillary distance is negligible. The knurled ring on the left tube serves as a correction collar to focus for the left eye independently of the right eye. A shutter is fitted inside, just below each eyepiece, operated by little handles at either side of the instrument. These shutters serve a double purpose—to be absolutely sure that one is really seeing equally well with each eye; also, to close off the left eye and focus for the right eye by means of the side fine adjustment; then, to close off the right eye and focus for the left eye by means of the correction collar on the left tube or ocular.

Outfit No.	Wide Angle Condenser	Nose-piece	Objectives Equiv. Foc. mm.	Apochromatic Outfits		Achromatic Outfits	
				Compens. Oculars	Price	Huyghenian Oculars	Price
2A	N.A. 1.40	.....	16, 4	10x	**308.50**	10x	**214.00**
2E	N.A. 1.40	Double	16, 4	10x	**315.00**	10x	**220.50**
2C	N.A. 1.40	.....	16, 4	10x, 15x	**334.50**	6x, 10x	**219.00**
2F	N.A. 1.40	Double	16, 4	10x, 15x	**341.00**	6x, 10x	**225.50**
2H	N.A. 1.40	Triple	16, 4, 1.8 * Oil imm.	10x, 15x	**475.50**	6x, 10x	**270.00**

* Apochromatic outfit has 2 mm. Oil imm.

This instrument can be supplied with three types of stages. For details, see Bacteriological Catalog, Section I.

For **High Power B. & L. Binocular**, see No. 4353.

4365

4365/1

4365. **SPENCER BINOCULAR MICROSCOPE No. 54**—This has proven to be a very desirable and serviceable instrument where only low power magnification 8 to 150 diameters is required.

This instrument is fitted with prisms which erect the image.

The prism chambers revolve on axes for a sufficient range to accommodate any pupillary distance. A shutter is provided to cut off the light when adjusting correction for either eye with collar on the objective for independent focus. At back of arm there is a small screw by which the entire binocular body can be removed and attached to a small simple stand which may be placed upon the object to be examined. Both stands are included in the outfit.

Outfit No.	Paired Objectives Equiv. Foc. mm.	Paired Huyghenian Oculars	Price
54A	40	10x	**96.50**
54B	48, 32	6x, 10x	**121.50**
54C	55, 40, 25	4x, 6x, 10x	**146.50**
54D	55, 48, 32, 25	4x, 6x, 10x	**166.50**
54E	55, 48, 40, 32, 25	4x, 6x, 10x	**186.50**

Binocular body, rack and pinion, no objectives or oculars	**54.00**
Large stand, only, in case	**13.25**
Small stand, only	**4.25**
Additional objectives ..... per pair	**20.00**
Additional oculars up to 12x ..... per pair	**5.00**

4365/1. **SPENCER PORTABLE BINOCULAR MICROSCOPE No. 59**—Has the same binocular body as above and is optically identical. Its unique design makes it the most compact portable binocular microscope yet produced. The stage, 88 x 110 mm., is modified to support hand rests. Case is of magnalium (wood is not used) 8¾x6½x3¾". With hand rests and full optical complement, No. 59E weighs, with case, 10 lbs. 10 oz. There are no loose screws or bolts to become lost.

Outfit No.	Paired Objectives Equiv. Foc. mm.	Paired Huyghenian Oculars	Price
59A	40	10x	**155.00**
59B	48, 32	6x, 10x	**180.00**
59C	55, 40, 25	4x, 6x, 10x	**205.00**
59D	55, 48, 32, 25	4x, 6x, 10x	**225.00**
59E	55, 48, 40, 32, 25	4x, 6x, 10x	**245.00**

4365/2

4365/5

4365/2. SPENCER CONVERTIBLE BINOCULAR MICROSCOPE No. 58—Most adaptable type of binocular stand.

The prism body is mounted on a double jointed arm, and permits rotating the optical body to any position of an entire circle.

The stage is 127 x 114 mm., fitted with a removable metal frame and with a plate glass stage.

A wooden board 212 x 324 mm. covering the base is furnished, which can be used as a stage for pans or large objects.

Outfit No.	Paired Objectives Equiv. Foc. mm.	Paired Huyghenian Oculars	Price
58A	40	10x	**120.00**
58B	48, 32	6x, 10x	**145.00**
58C	55, 40, 25	4x, 6x, 10x	**170.00**
58D	55, 48, 32, 25	4x, 6x, 10x	**190.00**
58E	55, 48, 40, 32, 25	4x, 6x, 10x	**210.00**

Additional objectives .....per pair **20.00**
Additional oculars up to 12x .....per pair **5.00**

4365/5. BAUSCH & LOMB BINOCULAR MICROSCOPE KA (Greenough type)—The body tube is a combination of two microscope tubes fitted with Porro prisms and is rotatable for adjusting positions of eye-pieces to observer's pupillary distance. One image merges with the other and the object is seen stereoscopically, erect and not transposed. Nose-piece provided takes self-centering slides, upon which a pair of objectives is mounted. It has the standard rack and pinion.

The stage is of metal, with large rectangular aperture provided with two removable plates, one of glass, 80 x 95 mm., the other of metal, same size, with aperture 22 mm. in diameter, underneath which a rotating plate provides white opaque, black opaque and ground-glass stops, or clear aperture; provided with detachable metal hand rests and spring clips.

With its plate removed, and the pillar detached, the stage serves as a base for the ready examination of large surfaces.

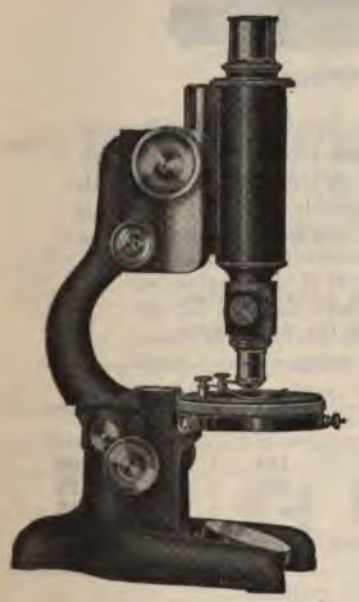
Outfit No.	Paired Objectives	Paired Eye Pieces	Price
KA 1	40 mm	10x	**108.00**
KA 3	48 mm 32 mm	6.4x 10x	**133.00**
KA 5	55 mm 40 mm 24 mm	5x 7.5x 10x	**158.00**
	Stage, taking plates 96 x 135 mm, in place of regular stage .....**6.00 extra**		

Metallography—Optical Apparatus

In no other line of industrial work has the need of the microscope been so generally recognized as in the inspection of metals. Every other test has been found uncertain in disclosing the underlying causes for the behavior of metals under strain, and the peculiar action of time upon them.

But the microscope has revealed new properties which determine the quality and behavior of the metal—factors which may be read at a glance and which offer a criterion by which the metal may be accepted or rejected with confidence. No other method offers such quick, accurate and conclusive results.

Metallurgical Microscopes are designed upon principles which differ fundamentally from those constructions used for biological and mineralogical investigations. This difference arises mainly from the fact that the metallurgist is solely concerned with opaque specimens. In the standard type of microscope, objects are studied by transmitted light, that is, by light passed through a transparent object or preparation with the aid of mirror or condenser. On the other hand opaque ores and metals, etc., require illumination by light brought to reflect upon them by means of a mirror or prism, in such a manner that it may continue the reflection at the object on through the objective and so reach the eye or the camera.



4378

4376. **BAUSCH & LOMB METALLURGICAL MICROSCOPE FM**—This new microscope is of a simple type, and moderate in price. It has the coarse and fine adjustments with a vertical illuminator.

The stage is 100 x 83 mm. with distance of 42 mm. from center to base of arm. Similar to No. 4378, but with rectangular non-revolving stage and top fine adjustment. Stand is not inclinable.

Outfit No.	Objectives Dry	Eyepieces	Vertical Illuminator	Price
FM 1	16 mm 4 mm	7.5×	No. 1789	**120.00**
FM 3	16 mm 4 mm	5×, 10×	No. 1789	**122.50**

Objectives included in above outfits are in regular size mounts; 4 mm. objectives are specially corrected for uncovered objects. If objectives are desired in short mounts, add **3.50** for each objective to above prices.

4378. **BAUSCH AND LOMB METALLURGICAL MICROSCOPE FSM**—This is the most popular metallurgical microscope and was designed by Dr. Albert Sauver of Harvard University for high-class work. It has circular revolving stage and can be fitted with mechanical stage. The stand may be used in a horizontal or in a vertical position and has side fine adjustment.

Outfit No.	Objectives Dry	Eyepieces	Vertical Illuminator	Price
FSM 1	16 mm 4 mm	5×	No. 1789	**198.00**
FSM 3	16 mm 4 mm	5× 10×	No. 1789	**200.50**
FSM 5	32 mm 16 mm 4 mm	5× 10×	No. 1789	**207.00**
	Attachable Mechanical Stage for FSM			**42.00**

4384

4385

4384. SPENCER METALLURGICAL MICROSCOPE No. 47—Adapted for metallurgical work, but can also be used for biological purposes. It has the coarse and fine adjustments. The stage is 120 mm. in diameter, vulcanite covered, and is fitted with centering screws, and can be racked up and down or entirely removed. A small frame for holding specimens with their polished surface upward is included in the outfit.

A large revolving mechanical stage can be fitted at an additional cost.

Microscope lamps Nos. 4390 to 4392 recommended for use with above.

Outfit No.	Vertical Illuminator	Nose-piece	Achromatic Objectives Equiv. Foc. mm.	Huyghenian Oculars	Price
47A	No. 350	.....	16, 4	10x	180.00
47B	No. 350	Double	16, 4	10x	186.25
47C	No. 350	.....	16, 4	6x, 10x	182.50
47D	No. 350	Double	16, 4	6x, 10x	188.75
47K	No. 350	Triple	32, 16, 4	6x, 10x	198.00

4385. TASSIN METALLOGRAPHIC OUTFIT No. BHM—complete with microscope BHM-7, including 32, 16 and 8 mm. objectives, 7.5x eyepiece and vertical illuminator with side tube and condenser, camera with ground glass focusing screen and double plate holder for 3½x3½ in. plates, illuminating system consisting of 15-watt lamp with hood, light shield and 20 feet of connecting cord **125.00**

a. **Microscope and Vertical Illuminator**—for above **107.00**

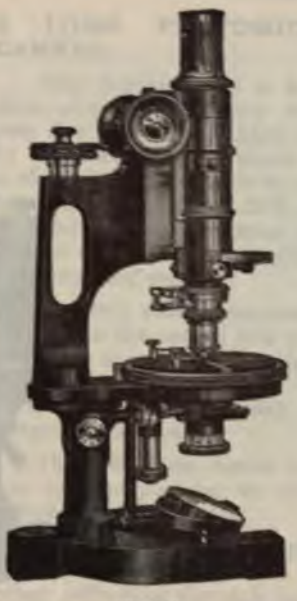
b. **Tassin Illuminating System**—for No. 4385—consisting of 15-watt, 120-volt lamp with socket and 20 feet of connecting cord, with enclosing hood, light shield and condenser for attaching to side tube of vertical illuminator **11.00**

c. **Tassin Illuminating System**—same as above, but including side tube and supplementary condenser for attaching to vertical illuminators not already fitted with side tube **16.25**

d. **Camera**—for No. 4385, for attaching to BHM microscope, with ground glass focusing screen, double plate holder for 3½x3½ in. plates, draw tube connecting with microscope and trap shutter **18.00**

e. **Case**—for microscope and camera **10.00**

4385/1



4385/3

4385/1. **BAUSCH & LOMB CHEMICAL** and **METALLURGICAL MICROSCOPE M**—The stage is circular revolving and graduated on the circumference in single degrees with every tenth line numbered. The substage **polarizer** consists of a high grade Nicol prism in a revolving mount with ring graduated in two-degree divisions. An **auxiliary stage,** which fits into the substage interchangeably with the polarizer, can be supplied for metallurgical work. The revolving stage is removed, leaving the auxiliary stage, with the vertical adjustment afforded by the substage, available for use. The **analyzer,** fitting over the eyepiece, is a Thompson prism in revolving mount and having a ring graduated in two-degree divisions, with every tenth line numbered.

Outfit Number	Objectives Dry	Cross Hair Eyepieces	Quick Changing Nosepiece	Price
M 1	16 mm. 8 mm.	10×12.5×	.....	**140.00**
M 2	16 mm. 8 mm.	10×12.5×	With Two Rings	**151.00**
M 3	32 mm. 16 mm. 8 mm.	5× 7.5× 10×12.5×	With Three Rings	**174.50**
	Auxiliary Stage			**6.25**

4385/3. **BAUSCH & LOMB PETROGRAPHICAL MICROSCOPE LCH**—Similar to above, but adapted for a greater variety of work. It has a slot for Bertrand lens with iris diaphragm above it. Eye-pieces have cross hairs and lens adjustable for focusing. Analyzer box slides in and out of body tube, which has a slot with dust-proof shutter placed just beneath analyzer for accessories. The illuminating apparatus has a three lens condenser 1.10 N.A. Polarizer has Nicol prism in revolving mount, graduated in 15 degree parts. The analyzer has a Thompson prism, revolvable a quarter turn, in sliding prism box, which carries graduations and indicator. Accessories included:—One selenite plate, mounted; one quartz wedge, mounted; one Quarter Undulation plate, mounted, and Bertrand lens, mounted; pinhole cap fitting draw tube for observing interference figures after Lasaulx method.

Outfit No.	Objectives	Cross-Hair Eyepieces	Quick Changing Nosepiece	Price
LCH 2	16 mm. 4 mm.	7.5× 10×	With Two Rings	**260.50**
LCH 4	32 mm. 16 mm. 4 mm.	7.5× 10× 12.5×	With Three Rings	**276.00**

4385/5

4385/5. **BAUSCH & LOMB PETROGRAPHICAL MICROSCOPE, LD** — for **Research Work.** The Body Tube is 55 mm. o.d. Inner Tube contains Bertrand lens with auxiliary lens above it and iris diaphragm below it. Eyepieces are of standard size with cross hairs and eye lens adjustable for focusing. A notch in upper edge of draw tube fixes azimuth of eyepiece. A dust-proof shutter is placed just beneath analyzer for accessories. Stage is revolving with clamping device set in any desired position and circumference is graduated.

Condenser is aplanatic 1.40 N.A. with upper 2 lenses removable.

The Polarizer has an Ahrens prism in revolving mount attached to swinging arm, permitting complete removal from optical axis. Above Polarizer is a revolvable carrier for sensitive tint plate.

The Analyzer has a Thompson prism, revolvable a quarter turn, in sliding prism box, allowing withdrawal from and return to, optical axis, entirely within body tube.

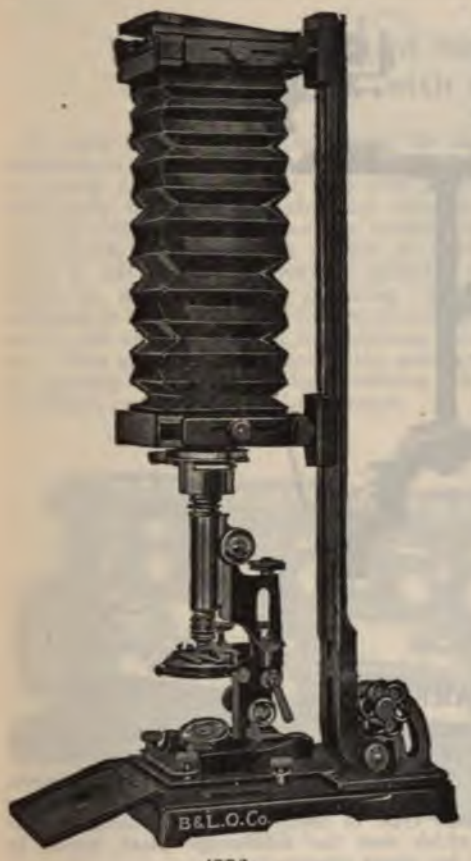
Accessories included are one selenite plate, one quartz wedge and one quarter undulation plate, all mounted to fit slot in centering nosepiece; Bertrand lens, mounted; one selenite plate, mounted, to fit substage; one slide-plate to carry blue glass and ground glass for insertion below condenser iris diaphragm when sensitive tint plate is withdrawn from optical axis.

Outfit No.	Objectives	Cross-Hair Eyepieces	Quick Changing Nosepiece	Price
LD 2	16 mm 4 mm	7.5× 10×	With Two Rings	554.50
LD 4	32 mm 16 mm 4 mm	7.5× 10× 12.5×	With Three Rings	570.00

Additional Accessories

1. Universal Holder and Positive Eyepiece to be used with the following accessories.. 26.75
   - (a) Graduated Quartz Compensator 30.00
   - (b) Bi-quartz Wedge Plate 33.50
   - (c) Coordinate Grating 17.50
   - (d) Cap Analyzer 13.75
2. Sliding Stop Eyepiece 21.50
3. Adjustable Support 17.50
4. Vertical Illuminator 22.25
5. Combination Wedge after Wright 14.50
6. Condenser Apertometer Plate 13.50

For further details in regard to the above outfit, write for special catalog.



4386

BAUSCH & LOMB PHOTOMICROGRAPHIC CAMERA.

This popular outfit is designed for medium power work in any laboratory. The base is a heavy metal plate on which slides an adjustable plate to which the microscope is clamped. The camera is adjustable along a graduated optical bed, 25½ inches long and provided with an inclination joint permitting it to be clamped in any position between the horizontal and vertical.

The two camera supporting frames are clamped to the optical bed and carry a bellows long enough to accommodate work at any distance along the bed. They have adjustments for centering with microscopes of different dimensions.

The first frame carries the front board with tube adapter for the microscope, or a shutter and this adapter.

The rear frame carries a plate holder box with a hinged cover at the back and two springs permitting the plate holder to be laid in place and then gently but firmly pressed into exact position. The focusing screen of ground glass with clear center slides in two grooves in the camera box.

The microscope plate has a movement of 4½ in., permitting the microscope to be removed from the optical center for examining a slide and quickly replaced. The adjustments on the plate will accommodate any standard microscope. An illuminant is necessary for use with this camera.

4386. **PHOTOMICROGRAPHIC CAMERA**—for 4 x 5 inch negatives **75.00**

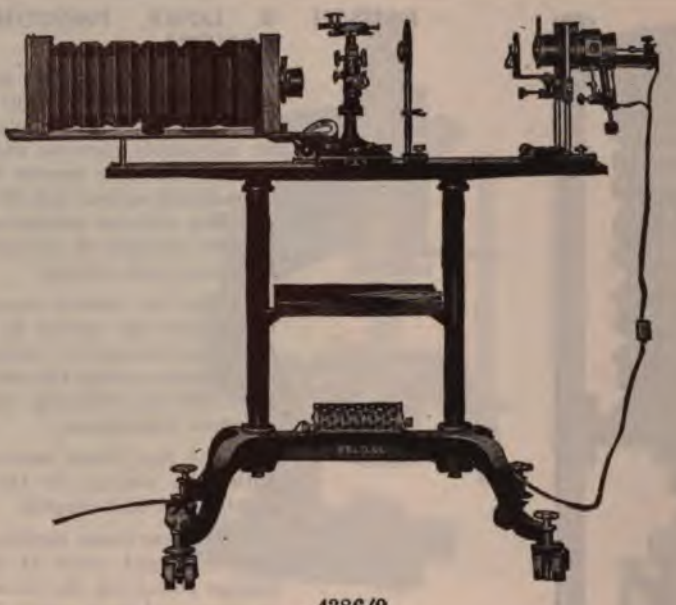
4386/1. **Ditto**—but for 5 x 7 inch negatives **80.00**
Automatic Shutter for above **17.50**

BAUSCH & LOMB PHOTOMICROGRAPHIC CAMERA TYPE M—This equipment has the camera bed, microscope plate and optical bed carrying illuminating accessories attached to a base plate supported by a floor stand. With the frame supporting the ground glass near the top of the camera bed, the apparatus is of a convenient height for a person of average stature to use when standing. The camera can be tilted back quickly by means of the inclination joint, if one desires to make a direct examination through the microscope, and the top of the microscope is then at a convenient height for the observer when seated in an ordinary chair. The arc lamp adjustments are within easy reach of the operator. With this apparatus any standard type of metallurgical microscope can be used. It is similar to Type L Camera, described on next page, but is not equipped with supplementary draw tube, and has stand 22" from floor instead of 39", as in the case of Type L.

4386/3. **MA7 Photomicrographic Camera**—with arc lamp and 4½-ampere rheostat for 110 volts direct current, as described above **260.00**

4386/4. **MM7 Photomicrographic Camera**—with 6-volt Mazda lamp and transformer for 110 volts, alternating current **250.00**

4386/5. **MA7–FSM9 Metallographic Outfit**—complete with MA7 camera and FSM9 microscope **509.00**



4386/9
LA7–IF9 Outfit

BAUSCH & LOMB PHOTOMICROGRAPHIC CAMERA TYPE L.

This camera, made according to suggestions from Dr. Albert Sauveur, is a very convenient apparatus to work with, as one can look down through the microscope in the regular way when visually examining the specimen; and then, by sliding in the supplementary draw tube, which is fitted with a 90° prism, can cause the image to be projected on to the ground glass. This arrangement makes possible the use of a horizontal camera in conjunction with a horizontal stage type of metallurgical microscope. The camera may be used in a vertical position if desired, in which case the microscope plate would be placed parallel with the optical bed and the side tube used for direct observation.

Specifications

Supporting Stand—Of cast iron; feet of stand have lateral spread of 25 in.; top plate, carrying camera bed and optical bed for illuminating accessories and microscope plate, is 45 x 7¾ in. and 39 in. from the floor; shelf, 12 x 15 in., is mounted between the standards of the stand for holding accessories.

Illuminating System—Consists of 5-ampere, 90° hand feed arc lamp with rheostat for 110 volts, or 6-volt Mazda lamp and transformer for 110 volts, aspheric condenser, 60 cm. in diameter, in focusing mount with removable iris diaphragm in front of mounting, support for ray filter, one ground glass, one blue glass and one green glass filter; all parts mounted on rigid frame adjustable for height on two rods with screws for vertical and lateral adjustment; supplementary condenser, 36 mm. in diameter, with iris diaphragm and light shield on adjustable support works in conjunction with aspheric condenser and vertical illuminator.

Microscope Plate—Attached to optical bed by means of clamps and arranged to be adjusted either long way at right angles to optical bed (as illustrated), or long way parallel to optical bed; fitted with bracket and pulley wheel, which may be connected with fine adjustment button, an extension rod being furnished for operating pulley wheel.

Camera—Optical bed 25 in. long, graduated to 60 cm. with inclination joint, wooden frames, bellows, ground glass and one double plate holder for 5 x 7-in. plates; wooden frames attached to two supports on optical bed, upon which they are adjustable to bring center of camera into alignment with microscope; fitted with automatic shutter and light-tight connector for microscope.

4386/6. **LA7 Photomicrographic Camera**—with arc lamp and 4½-ampere rheostat for 110 volts, direct current, as described above **290.00**

4386/7. **LM7 Photomicrographic Camera**—with 6-volt Mazda lamp and transformer for alternating current **280.00**

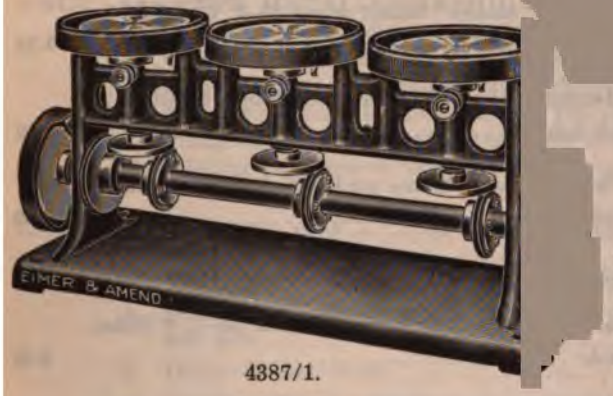
4386/8. **LA7–FSMT9 Metallographic Outfit**—complete with LA camera and FSMT9 microscope **566.00**

4386/9. **LA7–IF9 Metallographic Outfit**—complete with LA camera and IF inverted microscope **560.00**

The Preparation of Metal Specimens for Examination with the Microscope

In order to examine or photograph the microstructure of a metal, its surface must be cut or ground flat, then brought to a high polish, and finally treated with a chemical, which by unequal action, etches the surface, causing the less soluble constituents to appear in relief. Hard or soft constituents may be exhibited in alloys by uneven wear in polishing. Relief polishing is best effected by the use of soft material such as leather under the polishing powder. After etching, the surface of the specimen is generally improved by light rubbing with the finest powder on cloth or chamois.

4387 A & B



4387/1.

Wysor Combined Grinding and Polishing Machine

These machines accomplish all that is required in rough grinding the specimen and imparting to it the highest polish. They are, in fact, two machines in one, though quite simple in construction, and many of their good points may be seen at a glance. A one-piece casting forms the base and frame upon which all the parts are mounted. The grinding wheels for roughing, medium and finishing are of carborundum. The polishing discs are of brass with cloth coverings, and are easily replaceable on the head of the vertical spindle. This is driven by contact with a friction wheel on the horizontal shaft. It is disengaged when not in use, or when discs are to be exchanged, by means of a cam attached to the frame. The speed at which the polishing discs are revolved may be varied by shifting the friction wheel on the shaft. The disc upon which the specimen is first polished after the grinding is covered with canvas, and the powder used is emery flour. The second disc is covered with broadcloth, and tripoli powder is used. The third disc, on which the specimen is finished, is covered with broadcloth, jeweler's rouge being used with this. Separate cases are provided for holding the tripoli and rouge discs when not in use. This insures freedom from grit.

The polishing powders are mixed with water to the consistency of flowing paste, and may be kept in glass bottles from which they are conveniently poured into the glass bulb holders, which we recommend for applying them to the discs. When filling or shaking, the small opening of the bulb is closed by pressure of the finger, and when filled the large opening is closed with a tightly fitting rubber stopper. The three bulbs for the pastes and a fourth for clear water are held conveniently on a wooden tray, as shown in Fig. 4387D and E.

4387D and E

4387. **Wysor, Metallographic Grinding and Polishing Machine**—with 3 polishing discs, without motor **78.50**

4387A. **Ditto**—mounted on a cast iron base with ⅛ H. P. motor.
110 volts-D. C. current **122.50**
220 volts-D. C. current **125.00**

4387B. **Ditto**—mounted on a cast iron base with ⅛ H. P. motor.
110 volts-A. C. current **122.50**
220 volts-A. C. current **125.00**

4387/1. **Wysor, Metallographic Grinding and Polishing Machine**—large size with 3 spindles, as illustrated, without motor **120.00**

For accessories, see next page.

Accessories for Wysor Grinding and Polishing Machine

4387C	**Motors** for large machine quoted on request.	
4387C	**Extra Polishing Cloths,** set of five	.50
4387D	**Glass Emulsion Bulbs** with rubber stopper. (For cut, see preceding page)	.55
4387E	**Wooden Stand** for 4 emulsion bulbs. (For cut, see preceding page)	2.20
4387F	**Emery Flour**—per lb.	.15
4387G	**Tripoli Powder**—per lb.	.15
4387H	**Jewellers' Rouge**—per lb.	.45
4387IC	**Grinding Wheel—Carborundum, Coarse,** "Aloxite" brand, grade 40–3, 6 inches diameter, ¾ inch thick, with ½ inch hole	3.25
4387IM	**Grinding Wheel—Carborundum, Medium,** "Aloxite" brand, grade 100–3, 6 inches diameter, ⅜ inch thick, with ½ inch hole	2.50
4387IF	**Grinding Wheel—Carborundum, Fine,** "Aloxite" brand, grade FF–3, 6 inches diameter, ⅜ inch thick, with ½ inch hole	2.50
4387K	Extra Polishing Disc—Brass	4.50
4387L	**Grinding Wheel—Alundum, Coarse,** elastic wheel for roughing, grade 46–4, 6 inches diameter, ¾ inch thick, ⅜ inch hole	2.90
4387M	**Grinding Wheel—Crystolon, Medium,** for removing lines, grade F–N, 6 inches diameter, ⅜ inch thick, with ⅜ inch hole	2.40
4387N	**Grinding Wheel—Crystolon, Fine,** for semi-polishing, grade XF–M, 6 inches diameter, ⅜ inch thick, with ⅜ inch hole	2.40

4387/5

4387/5. **METALLOGRAPHIC GRINDING MACHINE**—used for grinding, polishing and finishing metal specimens and other materials, such as hard rubber, bone, celluloid, wood, etc. The machine is equipped with an idler pulley, tight and loose pulley, belt shifter and grinding rest. Complete with 3 grinding belts of various grades of carborundum cloth 45.00

Accessories

(a) 8 inch vertical **Disc Wheel** attachment 10.00

(b) **Leather Belts**—for polishing 7.00

(c) **Cotton Belts**—for polishing. 6.00

4387/7 and 8

4387/7. SAUVEUR METALLOGRAPHIC GRINDING MACHINE—A polishing motor with elongated spindles carrying at one end an alundum wheel for grinding, and at the other a cloth covered disc for polishing, providing four surfaces of graduated fineness. Sheet metal shields catch any surplus materials thrown off during driving. The motor is entirely protected from grit and dust, and runs at about 1200 R.P.M. Outfit includes one pound each of emery flour, tripoli, and jewellers' rouge, and three polishing discs, one of alundum, and two of composition. For 110 volts D. C..... **165.00**

4387/8. Ditto—For 110 volts A. C., 60 cycle, single phase **165.00**

Accessories

a. **Grinding Wheel—Alundum,** grade 80–P, 8 inches diameter, ¼ inch thick, with $\frac{11}{16}$ inch hole **2.70**

b. **Ditto**—½ inch thick **4.00**

c. **Grinding Wheel—Alundum,** for semi-polishing, grade 200-M, 8 inches diameter, ½ inch thick, $\frac{11}{16}$ inch hole **4.00**

d. **Polishing Discs—F Composition,** for covers on both sides ¾" thick .....each **6.60**

e. **Polishing Discs—Composition,** for covers on one side ½" thick .....each **5.00**

f. **Polishing Cloths—Broadcloth,** 10 inches square .....per dozen **7.70**

g. **Polishing Cloths—Canvas Duck,** 10 inches square .....per dozen **2.00**

Microscopical Accessories

For Dissecting Microscopes, Binocular Magnifiers, all Objectives and Oculars, Table of Magnifications, Ocular Micrometers, Stage Micrometers, Demonstrating Oculars, Revolving Nose Pieces, Abbe Drawing Cameras, etc., also for fuller details of accessories listed in the following pages, see Bacteriological Catalog, Section I.

4388. SUBSTAGE CONDENSERS—for Bausch & Lomb and Spencer Microscopes.

4388

	Description	Price
A.	Abbe Condenser N.A. 1.20	**12.00**
B.	Abbe Condenser N.A. 1.40	**14.50**
C.	Achromatic Condenser N.A. 1.30	**35.00**
D.	Aplanatic Condenser N.A. 1.40 *	**36.00**

* Does not include iris diaphragm; if this is desired add **6.00.**

4388/1

4388/2B

4388/3

4388/1. **BAUSCH & LOMB DARK-GROUND ILLUMINATOR**—This is a new type of illuminator invaluable for the examination of objects invisible with ordinary means of illumination. It furnishes a reliable and rapid method for examining unstained and living micro-organisms, hence its great value in medical and biological research; it is also suitable for the investigation of colloidal substances. For details, see Bacteriological Catalog, Section I.

Dark-Ground Illuminator in centering mount with iris diaphragm **21.50**

SPENCER DARK FIELD ILLUMINATOR—Supplied in two forms, type A and type B. One is placed on the stage of the microscope, the other beneath the stage. Where a few dollars' difference in cost is not a matter of great importance, we recommend the latter. First, because the centering screws enable the operator to control the position more accurately than can be done with the former type. Secondly, because it can be focused by means of the rack and pinion or "quick screw" of the substage, thus compensating for varying thickness of slide. Thirdly, because its construction is such as to better conserve and concentrate the light at exactly the desired point.

4388/2A. **Spencer Dark Field Illuminator**—including diaphragm for 1.8 mm. oil-immersion objective; in case **14.00**

4388/2B. **Spencer Dark Field Illuminator**—including diaphragm for 1.8 mm. oil-immersion objective; in case **22.00**

BAUSCH & LOMB VERTICAL ILLUMINATOR—Used on the Microscope for illuminating opaque objects, particularly metal surfaces. The illuminator is placed immediately above the objective, being attached to the body tube and the objective by society screw threads at either end. This reflector directs the light, coming through an aperture in the side, down through the objective onto the object. A threaded aperture is provided to receive the condenser tube, when this is ordered.

4388/3A. **Vertical Illuminator**—as above, consisting of a plane glass reflector, full circle, so mounted as to be readily adjusted by means of a head at the side. The reflector carrier is mounted on a slide providing for centering **13.25**

4388/3B. **Ditto**—but with side tube carrying adjustable condenser with iris diaphragm attached. **22.25**

4388/3C. **Vertical Illuminator**—as above with a mirror semi-circular reflector, which provides for oblique illumination, instead of plane glass reflector **13.25**

4388/3D. **Ditto**—but with side tube carrying adjustable condenser with iris diaphragm attached. **22.25**

4388/3E. **Vertical Illuminator**—as above, complete equipment, plane glass reflector, mirror reflector and side tube carrying adjustable condenser and iris diaphragm **25.75**

4388/5

4388/5. **SILVERMAN ILLUMINATOR**—especially used in the photographing of opaque and semi-opaque objects, consists of a small circular tube electric lamp, held in place around the objective by a holder, the proper current being supplied from the lighting circuit through a rheostat. Dry cells or a storage battery may be used. The lamp is silvered so as to form a reflector throwing the light inward and downward on the specimen. The lamp is made in plain (colorless) glass and in daylight (blue) glass. There are a shutter and an absorption disc for controlling the light. Descriptive bulletin on request.

Complete equipment consisting of 1 illuminator holder, 2 illuminator lamps of plain (colorless) glass, 1 rheostat with switch and key, 1 flexible cord from illuminator to rheostat, 1 attachment plug and cord from rheostat to lamp socket, 1 stage adapter, 1 shutter, 1 absorption disc. With rheostat for 104-124-volt circuit **45.00**

4388/6. **Ditto**—with rheostat for 208-248-volt circuit **46.00**

If the two illuminator lamps are desired of daylight (blue) glass, add **1.00** to price. Plain glass lamps are furnished unless otherwise specified.

a. Extra lamps, plain (colorless) glass .....**each** **4.00**

b. Extra lamps, daylight (blue) glass .....**each** **4.50**

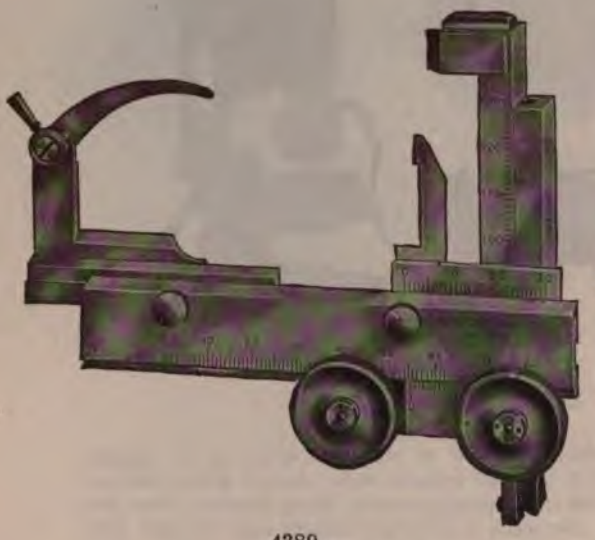
When ordering state exact voltage of your electric current.

4388/7

4388/7. **BULL'S EYE CONDENSER.**—For illuminating opaque objects and to throw parallel rays of light upon the mirror from an artificial source in ordinary work with transparent objects. Plano-convex lens mounted upon stand, adjustable to any position, 38 Millimeters diameter **5.75**

4388/8. **Ditto**—56 Millimeters diameter ... **7.25**

4388/9. **Ditto**—75 Millimeters diameter ... **11.50**



4389

4389/1

With a mechanical stage, the microscopist can examine systematically and conveniently an entire slide area. By means of the graduated scale readings, he also can locate a particular point on the field and return to it at any time by simply attaching his stage in the same position and setting his adjustment to accord with his original readings.

4389. **MECHANICAL STAGE—For B. & L. or Spencer Microscopes**—For bacteriological, blood and sputum work, this stage is of great value. The movements are by diagonal rack and pinion, and are entirely firm and reliable, permitting the most delicate adjustments. The range of movement is large in both directions, giving 85 mm. lateral motion and 40 mm. vertical. It permits the use of slides of varying sizes. The milled heads are placed close together, so both may be easily moved by the fingers of one hand **27.50**

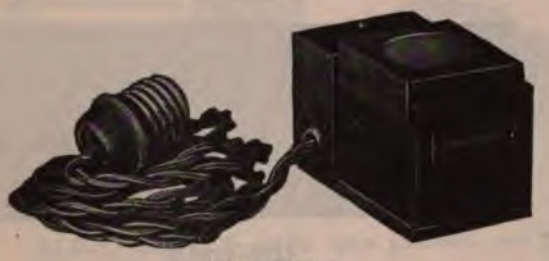
4389/1. **MICRO WARM STAGE—Electrically Heated.** This appliance, which will fit any microscope, is complete with Heating Element, Thermometer and an Electric Thermostat, which can be adjusted to maintain any desired temperature. The appliance measures 3½ inches diameter ½ inch in thickness, with ¾-inch hole in center..... **16.00**

When ordering state voltage.

4389/2

4389/2. **MICROSTAGE INCUBATOR—Electrically Heated.** This is a complete little incubator that will fit the mechanical stage of any microscope. Outside dimensions 3½x2x½ inches; chamber dimensions 2⅜x¾x½. It is fitted with removable glass bottom; the top consists of a regular microscopic glass slide. The temperature can be adjusted to any desired degree by simply turning the adjusting screw shown at top of the illustration **20.00**

When ordering state voltage.



4390–4390/1

4391

MINIATURE MICROSCOPE LAMP—This is decidedly the most popular of all microscope lamps. It measures 2x2x3½", and is low enough to work beneath the substage condenser. For description, see **Bacteriological Catalog,** Section I.

4390. Lamp with bulb, blue and ground glasses **6.00**

4390/1. Lamp with bulb, and "Daylite" glass **7.00**
a. Extra bulb, only **1.40**
b. Resistance to be used in series on 220-volt current **4.25**

MICROSCOPE LAMP—Adjustable as to both height and angle. Fitted with the standard commercial (pear shaped) gas filled bulb, usable on any 110 volt current. The bulb is used end on, a reflector behind it giving ample illumination for 1.5 mm. oil-immersion objectives and high power oculars. It is also very serviceable for illuminating opaque objects, and for all work with a binocular microscope.

Supplied with 5 feet of cord and attachment plug, and with key socket.

4391. Lamp with 100-Watt, 110 volt, P. S. 25 clear glass, gas-filled Mazda bulb, fitted with condenser and with "Daylite" glass **15.00**
a. 110-Watt, 110 volt, P. S. 25 Mazda bulb **1.80**
b. Resistance for 100-Watt bulb, in series on 220-volt current **7.50**

4392

MICROSCOPE ARC LAMP—This lamp serves excellently for general microscopic illumination, although designed specially for use with dark field or vertical illuminator. It is adjustable in height and angle on its upright support. With 5 feet connecting cord, blue glass and ground glass.

4392. Microscope Arc Lamp **23.50**
a. Fixed Rheostat for 110-volts **8.75**
b. Fixed Rheostat for 220-volts **12.00**
c. Extra Carbons, each ..... **.06**
d. Daylite glass adapter for above lamp, extra **2.25**
e. Globe Condenser, on stand, for use with Gas Lamp **2.25**

For other **Microscope Lamps,** see **Bacteriological Catalog,** Section I.

4393–5

4396–8

4398–4398/3

COVER GLASSES—Squares, best quality, in ½ oz. boxes.

	Size, mm.	16	19	22	25
4393.	**Thickness No. 1** ....per oz.	**1.25**	**1.25**	**1.25**	**1.25**
4394.	**Thickness No. 2** ....per oz.	**1.10**	**1.10**	**1.10**	**1.10**
4395.	**Thickness No. 3** ....per oz.	**1.00**	**1.00**	**1.00**	**1.00**

COVER GLASSES—circles, best quality, in ½ oz. boxes.

	Size, mm.	16	19	22	25
4396.	**Thickness No. 1** ....per oz.	**1.25**	**1.25**	**1.25**	**1.25**
4397.	**Thickness No. 2** ....per oz.	**1.10**	**1.10**	**1.10**	**1.10**
4398.	**Thickness No. 3** ....per oz.	**1.00**	**1.00**	**1.00**	**1.00**

COVER GLASSES—rectangular, best quality.

	Size, mm.	18x40	24x30	22x40	22x50	24x50	24x60	35x60	55x80
4398/1.	**Thickness No. 1, per oz.**	**1.25**	**1.25**	**1.25**	**1.25**	**1.25**	**1.25**	**1.25**	**1.25**
4398/2.	**Thickness No. 2, per oz.**	**1.10**	**1.10**	**1.10**	**1.10**	**1.10**	**1.10**	**1.10**	**1.10**

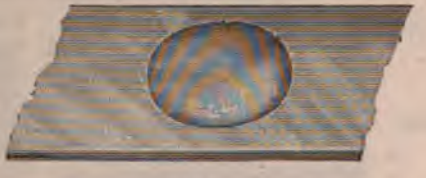
4398/3. **SLIDES—plain, clear glass,** with ground edges. Size, 75x25 mm. (3x1 in.).

Thickness	Thin	Medium	Thick
Per dozen	**.40**	**.40**	**.40**
Per gross	**3.00**	**3.00**	**3.00**

4398/3g. **SLIDES**—plain glass, greenish tint, with ground edges. A grade less expensive than the clear white No. 4398/3. Size 75x25 mm. (3x1 in.). Medium thickness.....**dozen** **.30**
gross **2.20**

4398/4. **SLIDES**—larger sizes, medium thickness.

Size, mm.	75x37	75x50
Per dozen	**.35**	**.45**
Per gross	**2.80**	**3.50**



4398/5

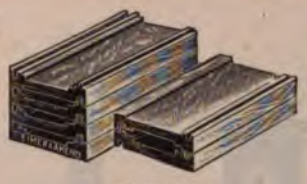
4398/6

4398/5. **SLIDES—with cavities,** ground and polished; clear glass, ground edges. Size 75x25 mm.

No. of Cavities	1	2	3
Per doz.	**1.25**	**2.00**	**2.70**
Per gross	**12.50**	**20.00**	**27.00**

4398/6. **SLIDES—Drop Culture,** heavy glass, with deep cavity. Size 75x25 mm. .....**each** **.50**

4399



4399/4

4399/6

4399. **SLIDE LABELS**—white, extra gummed: size 22 mm. square, 100 to a box...per box .15
10 boxes 1.25

4399/1. **Ditto**—size 23x15 mm., 100 to a box .....per box .20

4399/2. **SLIDE LABELS—Books,** size 22 mm. square, in books of 500 labels.....per book .25

4399/3. **LENS PAPER—for cleaning slides and cover glasses;** in sheets 28x38 cm.per quire .30
per ream 5.00

4399/4. **SLIDE MAILING CASES—Of wood,** in two sections which are exactly identical. Only the edge of the slide is held in the case; the recess is of sufficient size to hold slides of variable thickness. To accommodate slides 75x25 mm. (3x1 inches).per doz. .30

4399/5. **SLIDE BOXES—Of light wood** with tight-fitting cover. The box for 25 has an index, and a number for each slide is provided inside the box, while a label on the end of the outside furnishes a space for recording the titles. To accommodate slides 75x25 mm. (3x1 inches).

Capacity, slides	6	12	25
Each	.12	.15	.17
Per dozen	1.20	1.50	1.65

4399/6. **Ditto—with overlapping cover,** to accommodate 25 slides, 75x25 mm. (3x1 inches) .....per dozen 2.10

4399/8

4399/7. **Ditto—with overlapping cover,** to accommodate 25 slides, 75x50 mm. (3x2 inches)..per dozen 3.90

4399/8. **SLIDE BOXES—Of wood and heavy cardboard,** suitably covered; compact and convenient. A numbered slide index is provided, while a register on the inside of the cover gives ample space for recording data of interest. To accommodate 100 slides 75x25 mm. (3x1 inches)
each 1.00
per dozen 10.80

4399/9. **SLIDE TRAYS—Cardboard,** with folding flaps and fasteners to keep trays closed. To accommodate 20 slides, 75x25 mm. (3x1 inches); without fastener .....prices on application

4399/10. **Ditto**—with fasteners to keep the trays closed
prices on application

4399/11. **SLIDE CABINET—Of polished white wood,** arranged to allow removal of any tray desired without interfering with any other. With 12 double trays, accommodating 144 slides, 75x25 mm. (3x1 inches).

For slides	36	48	72	144

prices on application

4399/12. **SLIDE CABINET—Of metal.** This is a more compact cabinet than those of wood: it affords better protection against fire, and is kept clean more readily. Contains 30 trays, fitted with card holders and knobs, each accommodating 24 slides, 75x25 mm., 720 in all. The trays and inside of the cabinet are japanned black; the exterior is maroon with bronze striping. The cabinet is equipped with a brass lock. Measurements 36.5 cm. high, 32.5 cm. deep, 17.5 cm. wide 45.00

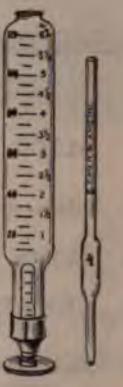
MICROTOMES AND ACCESSORIES—See **Bacteriological Catalog,** Section I.

4402

4408

4410

4412



4428

Apparatus for Milk Analysis

Babcock Milk Testers—See Centrifuges.

BRUSH—For cleaning milk test bottles, see No. 1204/2.
For other brushes, see Brushes.

4402. **BURETTE—Automatic,** for delivering six charges (each 17.6 cc.) of sulfuric acid without refilling; complete with reservoir **9.00**
a. **Burette** only for above **5.00**

4404. **BURETTE—Geissler,** with stopcock, style No. 1310, graduated for charges (17.6 cc.) of acid.

For charges of acid	6	12	25
Each	**3.50**	**4.00**	**5.00**

CAPSULES—Lead tin foil, for milk analysis, see No. 2640.

4408. **CREAMOMETER—Chevalier,** with red lines to show the percentage of cream **1.60**

4410. **CREAM TUBE**—Graduated to read direct percentage of cream ..... **.50**

4411. **Ditto**—large size, on glass foot **1.20**

4412. **LACTOMETER—New York Board of Health pattern,** latest form. The scale is graduated to read percents; 100 = 1.029 Sp. Gr., 75 = 75% milk, and so on **1.25**

4432

4414. **Ditto**—with thermometer **4.00**

4416. **LACTOMETER—Quevenne,** Sp. Gr. 1.014 to 1.042 ..... **1.25**

4418. **Ditto**—with thermometer **4.00**

4426. **LACTOBUTYROMETER—Marchand,** on foot **2.00**

4428. **LACTOSCOPE—Feser,** for rapid determination of fat in milk; with pipette and directions in case **7.50**

4432. **HOLT APPARATUS—For testing human milk,** consists of two graduated stoppered cylinders, lactometer and cylinder; complete in box with instructions **4.00**

4434. **PAPER—Fat extracted,** for the determination of fat in milk. In strips 560x65 mm., in packages of 50 ..... **2.80**

4436. **Ditto**—in packages of 100 ..... **5.20**

4437

HORTVET CRYOSCOPE

For Freezing Point determinations on samples of milk and other fluids, also for Physico-chemical investigations in which Freezing Point results are required. Permits of very rapid tests; usually only seven or eight minutes are required. The inconvenience and annoyance ordinarily accompanying such tests are avoided. The operation is also very economical. Modified milk is now regularly sold everywhere, though the specifications of practically all cities call for unmodified milk.

The Hortvet Cryoscope offers the best, quickest, and most economical method of determining exactly the percentage of added water in the milk that is being tested.

4437. CRYOSCOPE—Hortvet, complete, including Vacuum Bottle with metal case, special top with metal tubes, pair of special test tubes, metal stirrer, air drying tube, 1 control thermometer No. 4437/2, and 1 milk freezing point thermometer No. 4437/3, scale magnifier, ether disposal tube, ether funnel tube, rubber bulb and supporting stand with milk glass scale **70.00**

4437/1. CRYOSCOPE—Hortvet, Vacuum Bottle only with metal case, including top with metal tubes, metal stirrer, pair of special test tubes, funnel tube and rubber bulb. **25.00**

4437/2. Extra Control Thermometer—minus 30 to plus 30° C. in 1° **6.00**

4437/3. Extra Milk Freezing Point Thermometer—minus 2 to plus 1° C. in 1/100° **20.00**

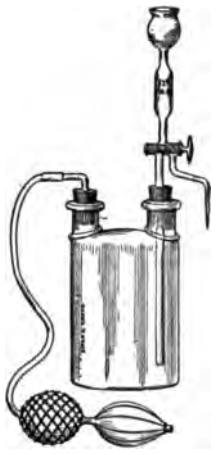
Separate Parts

a. Vacuum bottle only with metal case.
b. Large special test tube.
c. Small special test tube.
d. Metal stirrer.
e. Metal tube for vaporizing ether.
f. Metal tube, "T" shape.
g. Large cork stopper.
h. Small cork stopper.
i. Air drying tube (outer).
j. Air drying tube (inner).
k. Rubber connections.
l. Rubber bulb.
m. Glass funnel tube for pouring in ether.
n. Ether disposal tube with side tube near closed end.
p. Supporting stand including milk glass scale.
q. Supporting stand, **not** including milk glass scale.
r. Milk glass scale only.
t. Thermometer scale magnifier for observing accurately and estimating to 0.001° C.

Extras Not Included in No. 4437

v. 6 ft. rubber pressure tubing for above.
w. Blower for ether fumes No. 774.
x. Thermometer tapper.
y Freeze starter.

For further details write for Bulletin No. 267.


4440

4442

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4456/1

4460

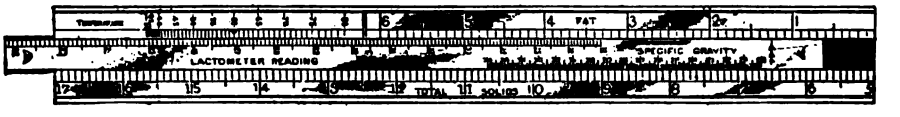
4440. **PIPETTE—Automatic,** delivers 17.6 cc., complete with reservoir and rubber bulb **11.00**

REFRACTOMETER—for determining fat in milk, see Refractometers.

4442. **MILK TUBE—Stoke,** graduated to 50 cc., for estimation of fat in milk **1.10**

4444. **LACTIC ACID TUBE—Strauss,** for the estimation of lactic acid in gastric juices **2.75**

4446. **TABLETS—Farringdon,** for testing the acidity of milk .....**in boxes of 100** **1.00**



4448

4448. **SLIDE SCALE—Richmond,** for estimation of total solids in milk; with scale for temperature correction of specific gravity **5.00**

4450. **TEST BOTTLE—Babcock,** for milk, 6 inch, 18 grams, graduated 10% in ⅛%...**each** **.30**
dozen **3.00**

4451. **TEST BOTTLE—Babcock,** for milk, 8%, 6 inch, 18 grams, **Government Standard** .....**each** **.33**
dozen **3.30**

4452. **TEST BOTTLE—Babcock,** for cream, 6 inch, 18 grams, graduated 30% in ½%..**each** **.30**
dozen **3.00**

4454. **Ditto**—graduated 50% in ½% .....**each** **.30**
dozen **3.00**

4455. **TEST BOTTLE—Babcock,** for cream, 50%, 6 inch, 9 grams **Government Standard** .....**each** **.35**
dozen **3.50**

4456/1. **TEST BOTTLE—Wright,** perfect butter test, for determining the amount of moisture and over-run in butter; graduated in ⅛%; complete with funnel .....**each** **.45**
dozen **4.50**

4460. **TEST BOTTLE—Perfect Skim-milk,** graduated to 50/100% in 1/100%. Used especially in Dairy Schools, and by Separator Manufacturers, and many others, to whom closeness in skimming is of prime importance .....**each** **.80**
dozen **8.00**

4462. **ACID MEASURE**—On foot, 17.6 cc. .....**dozen** **1.60**

4464. **ACID PIPETTE**—17.6 cc. for Milk .....**dozen** **2.40**

4464/1. **Ditto**—18 cc. for Cream .....**dozen** **2.40**

4465. **JONES DIRT TESTER**—for **Milk,** consisting of tin metal cylinder, Buchner funnel with rubber stopper, filter flask, rubber tubing, and bundle of Cotton Discs.... **6.00**

a. **Bundle of Cotton Discs** (40 pcs. to Bdle.).....**extra** **1.00**

4471

4471f

4471c

4471. MOISTURE TESTER—(Mojonnier) Model F. For Laboratories where high speed is not necessary. The test for moisture in any product can be made with the apparatus in one hour or less. The apparatus consists of Vacuum Oven, Vacuum Pump, and air-cooled desiccator, and can be placed directly upon the laboratory table. Complete with all accessories as illustrated **415.00**

Arranged for 110 and 220 volts, direct or alternating current.
State current and voltage when ordering.

Specifications

Table space over all, 20¼x28 in. Height over all, 23 in. Height to hot plate from table, 12 in. Dimensions of vacuum Oven, above heating plate, 7x15x3½ in. Dimensions of hot plate, 7x15 in. Shipping weight, approximately 210 lbs.

Extra Parts

4471a. VACUUM OVEN—inside dimensions 7″ wide, 15″ long, 3½″ high, complete with rheostat, snap switch, extension cord and plugs, one 250° C. thermometer, one thermometer holder, one vacuum gauge, cocks for releasing and applying the vacuum. **115.00**

Shipping weight, approximately 85 lbs. Arranged for 110 and 220 volts, alternating or direct current. State current and voltage when ordering.

4471b. VACUUM PUMP—Complete with pump, motor, detachable plug and 6 ft. cord for attaching to any lamp socket.

	A. C.		D. C.	
Volts	110	220	110	220
Each	**68.00**	**70.50**	**58.00**	**60.50**

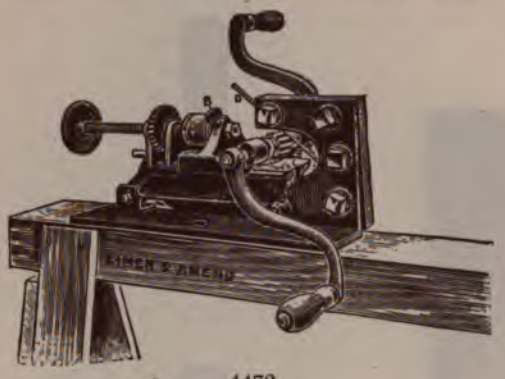
4471c. AIR COOLING DESICCATOR—of burnished copper, inside dimensions 12″ diameter by 3″ high **15.00**

4471d. ALUMINUM DISH—flat bottom.

	Plain		Counterpoised and numbered	
Size	3x1″	3½x2″	3x1″	3½x2″
Each	**.40**	**.50**	**1.00**	**1.10**
In doz. lots, each	**.35**	**.45**	**.90**	**1.00**

4471e. ALUMINUM DISH COVER—for covering any of the above dishes ..... **.25**

4471f. DISH CONTACT MAKER—nickel plated brass, to press dish firmly down **1.25**



4472

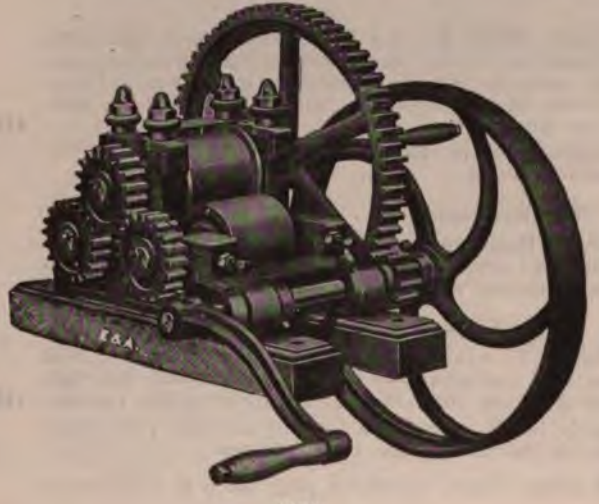
4474

Mills

For other Mills and Pulverizers, see Crushers.

4472. **MILLING MACHINE**—Designed by C. M. Johnson for obtaining samples of irregularly shaped steels, including thin sheets, wires, etc., of sufficiently small mesh for the determination of carbon by the direct method **60.00**

4474. **MILL—Warmouth-Hyatt Laboratory Disintegrator.** The most satisfactory machine for preparing sugar cane, bagasse, sugar beets and all fibrous materials for laboratory analysis. It will reduce almost any plant stalk or fleshy root to a state of fine division for analysis. Speed recommended, 1500 R. P. M. **600.00**



4476

4482

4476. **MILL—The Ideal Sugar Cane Mill,** for quickly and satisfactorily extracting the juice from the cane; the ideal mill for laboratory and other purposes. **No. 1 with 2 rolls,** single gearing for hand power; rolls 4 by 4 inches, capacity ¾ ton of cane per 12 hours **100.00**

4478. **Ditto—No. 2 with 3 rolls,** adjustable cane knife, pressure regulators, and single gearing for hand power; rolls 5 by 5 inches, capacity 1¼ tons of cane per 12 hours **155.00**

4480. **Ditto—No. 2,** fitted with pulley for power **170.00**

4482. **MILL—Bagasse Cutter or Shaver,** for automatically cutting bagasse and other fibrous materials for analysis. The automatic feed can be regulated to cut from shavings as thin as tissue, to slices ⅛ inch thick..... **28.00**

4496

4499

4501

4496. **MILL—Assayers,** for grinding ores, etc. The grinding surfaces are of hard metal **18.00**

4499. **MILL—Ointment,** hand driven No. 2. Grinders are 7½″ in diameter. Hopper 6″ deep and holds **1 gallon.** Furnished with a 14″ fly-wheel instead of crank, if desired **28.00**

4499/1. **Ditto**—arranged for power with T. & L. pulleys **44.00**

4499/2. **MILL—Ointment,** similar to above, for power only, with T. & L. pulleys, either plain or water cooled. Grinders are 12″ in diameter. Hopper is 8½″ deep and holds **3 gallons.** Capacity 300 to 400 lbs. per day. Requires about ½ H. P. **95.00**

4501. **MILL—Excelsior,** for power, newly constructed with Roller Bearings. The material to be ground, in dry as well as in wet condition, is thoroughly and uniformly divided; 500 to 800 R. P. M.; capacity from 1000 to 1500 lbs. grain. Requires 3 to 4 H. P. **240.00**

4501a. **Extra Grinding Plates** **26.00**

4502. **MILL**—For grinding drugs, roots, herbs, etc.

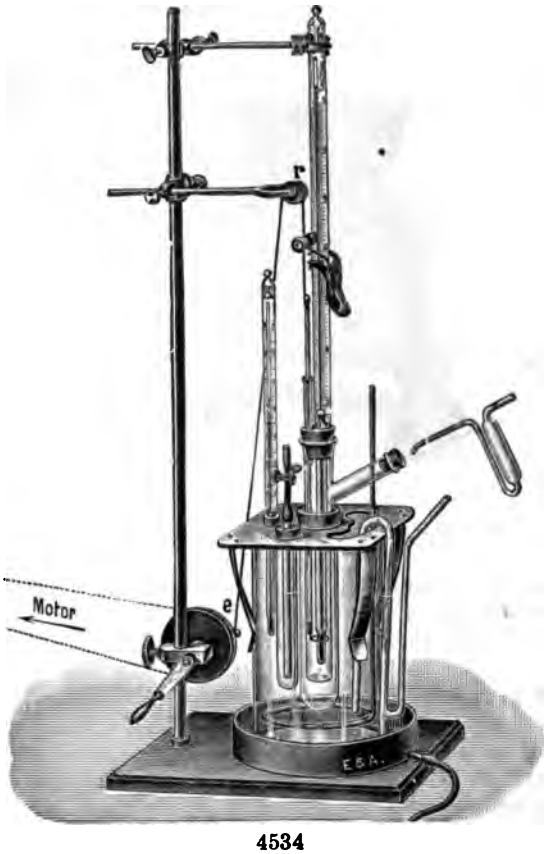
No.	1	2	3
Height, inches	12½	15	20
Each	**10.00**	**14.00**	**20.00**
4502a. **Extra set of plates**	**2.00**	**3.50**	**5.00**

4502

4508. **MILL—Rolling, for hand.** Improved **Single**-geared, with flat rolls.

No.	2	3	4
Dimensions of rolls, in..	1½x2	2¼x3	2¾x4
Weight, pounds ..	80	145	190
Each ...	**43.20**	**72.00**	**108.00**

4508



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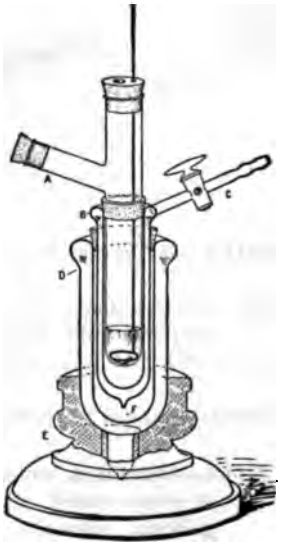


4541

Molecular Weight Apparatus

4534. **MOLECULAR WEIGHT APPARATUS—Beckmann, for the Freezing method.** The apparatus consists of a glass jar with nickel cover and nickel stirrer, 4 air jackets, 4 freezing tubes with corks, one inoculating rod, 3 filling pipettes and one rubber stopper, but without glass stirrer, thermometer, zinc trough, syphon or support **15.00**

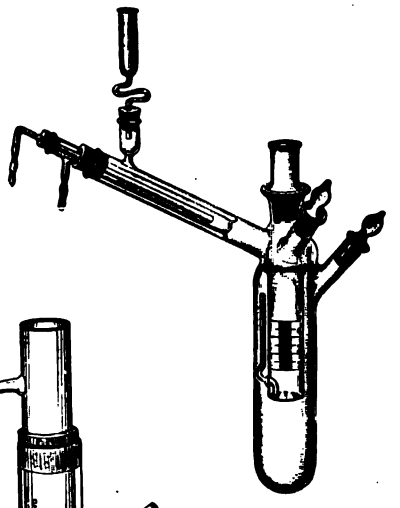
Accessories for Above

a. **Air Jacket** ..... **.50**
b. **Cooling Vessel,** with nickel cover and stirrer **7.50**
c. **Filling Pipette.** (Shown at extreme right of cut.) ..... **.75**
d. **Freezing Tube,** with corks **1.00**
e. **Freezing Tube,** with ground in stopper and ground in tubulation for thermometer.**extra** **4.75**
f. **Inoculating Rod** ..... **.80**
g. **Stirrer** of glass with platinum ring .....(According to market price)..**extra**
h. **Thermometer** for cooling mixture, graduated from –20° to 40° C., in 1 degree divisions .....**extra** **3.00**
i. **Thermometer, Beckmann Differential,** graduated in 1/100 degree divisions, see Nos. 6804–6817.
k. **Zinc Trough,** with siphon .....**extra** **4.00**
l. **Siphon** only for trough .....**extra** **1.00**
m. **Iron Support** with clamp, pulley and excentric wheel .....**extra** **10.00**

4541. **MOLECULAR WEIGHT APPARATUS—Beckmann,** for the Freezing method, for use with liquid air as cooling agent. The freezing-tube (A) is surrounded by a mantle (B); provided with a stopcock (C); by this means the air in (B) can be pumped out to a greater or lesser degree, thus regulating the heat loss to the liquid air contained in the Dewar flask (D); without platinum stirrer **22.50**

a. **Platinum Stirrer** .....(According to market price)..**extra**

CRYOSCOPE, Hortvet, see No. 4437.



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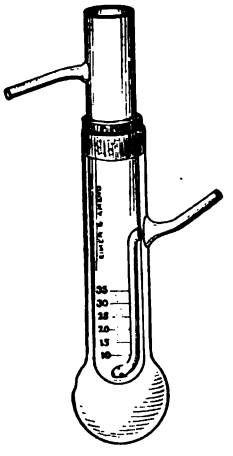

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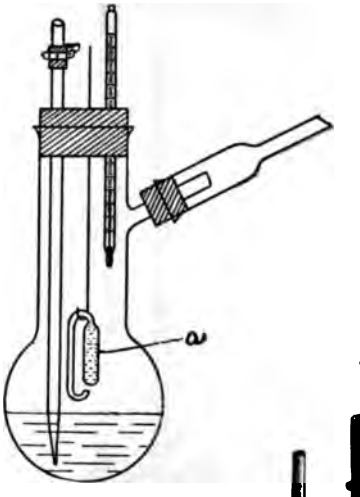


4565

4566

4560. **MOLECULAR WEIGHT APPARATUS—Boiling Vessel,** for liquids with small molecular boiling point rise; graduated, with 3 ground connections, and inner reflux condenser, for distilling back into the boiling vessel **14.00**

4562. **MOLECULAR WEIGHT APPARATUS—McCoy, for the Boiling method.** (Journal Am. Chem. Soc., April, 1900.) Graduated vessel, with jacket **3.50**

4563. **Ditto—Ground Glass Joints** **6.50**

4564. **MOLECULAR WEIGHT APPARATUS—Jones, for the Boiling method,** glass stoppered boiling vessel only **3.30**

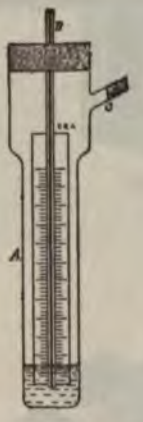
4565. **MOLECULAR WEIGHT APPARATUS**—for determining specific gravity at higher temperatures and for the determination of the molecular volume of liquids at their boiling points. See Practical Physical Chemistry, "Firth," page 12.

Without condenser and without thermometer **10.00**

4565a. **Picnometer only**—for above **1.00**

4566. **MOLECULAR WEIGHT APPARATUS—Menzies, for molecular weight determinations.** The apparatus can be used to determine the molecular weight of dissolved substances, by measuring the lowering of vapor pressure of the solution; also to determine the molecular weight of easily volatile substances by measuring their vapor densities. Glass parts, as illustrated **11.00**

4567



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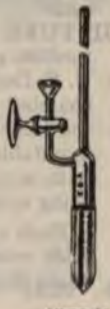
4568



4569/1

4567. **MOLECULAR WEIGHT APPARATUS**—According to Prof. **J. L. R. Morgan** of Columbia University. The molecular weight is determined by the weight of falling drops. The mass of these drops is dependent on the surface tension. Experiments are carried out at any fixed temperature below 90° C. and under conditions which prevent evaporation. (See Jour. of Amer. Chem. Soc., Vol. 37, 1915, page 1461.) Glass parts only, without thermometer **75.00**

4568. **MOLECULAR WEIGHT APPARATUS—Traube Stalagmometer,** see Findlay's Physical Chemistry, Fig. 29. The dropping tube or stalagmometer consists of a capillary tube the end of which is flattened out and the surface is then carefully ground flat and polished. The capillary is sealed to a wider tube on which a bulb is blown. On the stem of the tube two marks are etched, one above and one below the bulb. Set of three in case, without accessories **25.00**

4569. **MOLECULAR WEIGHT APPARATUS**—see Findlay's Physical Chemistry, Fig. 28, for determination of molecular surface energy and association factor of liquids. Comprises a glass capillary tube of about 0.4 mm. uniform bore, and approximately 15 cm. length. To this is attached by nickel wire a millimeter scale. The tube and scale are enclosed in a suitable vessel, being held in position by the stopper by which the vessel is closed. Instead of the millimeter scale the capillary tube is graduated, unless otherwise specified **3.25**

4569/1. **MOLECULAR WEIGHT APPARATUS—Osmotic Pressure Tube,** University of Chicago form, consisting of a glass tube of small bore 5 ft. long, with side arm with stopcock and funnel tube, complete with membrane for attachment to lower end **5.00**

a. **Extra membranes**—for above ..... **.50**

4574

MOISTURE APPARATUS—Brown & Duvel, for determining the amount of moisture in grain, according to the method adopted by the Bureau of Plant Industry, U. S. Dept. of Agriculture, see Bulletin No. 72. The apparatus consists of a heating chamber divided into compartments so that a number of samples can be tested at the same time; a tank for cold water, through which the condenser tubes pass; and a suitable stand for supporting the heating chamber and cold-water tank, together with numerous accessories, such as thermometers, distillation flasks, graduated measuring cylinders, etc.

Each compartment of the heating chamber is numbered and provided with a small mica window, through which the operator can observe the action within the flask while the test is in progress.

		Gas heated	Alcohol heated	Electrically heated
4570.	2 compartment, complete with glassware ..	**110.00**	**120.00**	**price on application**
4572.	4 compartment, complete with glassware ..	**140.00**	**160.00**	**price on application**
4574.	6 compartment, complete with glassware ..	**170.00**	**200.00**	**price on application**

Accessories

4582.	Distillation flasks, Pyrex glass, 1000 cc.	each	**1.50**
4583.	Distillation flasks, copper, single wall, 1000 cc.	each	**6.00**
4583/1.	Distilling flasks, copper, double wall inner vessel, 900 cc.	each	**10.00**
4584.	Thermometer graduated zero to 200° C. as per specifications	each	**3.00**
4586.	Condensing tubes	each	**.40**
4588.	Measuring cylinders, 25 cc. in ⅕ cc.	each	**1.00**
4589.	Measuring cylinders, graduated to show percentage of water up to 16% when 50 grams samples are used	each	**1.50**
4590.	Oil Measure		**.75**

4591. Oil for moisture testers in metal cans.

Capacity, gallons	1	5
Each	**1.25**	**5.00**

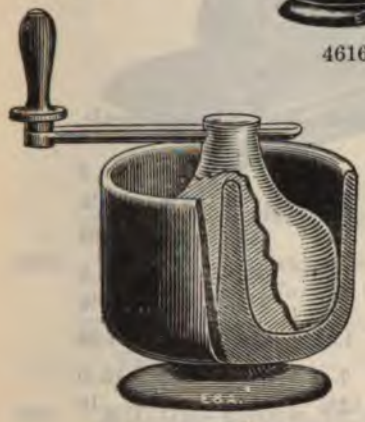
Test Tube Cleansers, see No. 1206.
Brush, flask, see No. 1204.
Wire gauze asbestos center, see No. 7456, 6 in.
Torsion scale, see No. 376.
Trip Scale, see No. 332.
Weights, see No. 516 to 500 grams.

4610

4616

4618

4624


4622

4626

4628

Mortars

Agate Mortar Grinder—See Crushers.

4610. **MORTAR—Agate,** with pestle; of superior quality.

Dia. o.d., mm.	40	50	65	75	90	100	110	125
Each	**4.50**	**6.00**	**9.00**	**13.50**	**18.00**	**22.50**	**26.00**	**30.00**

4616. **MORTAR—Glass, best make,** with lip and pestle.

Capacity, ounces	1	2	4
Diameter, inches	2	2¾	3¾
Each	**.30**	**.33**	**.45**

4618. **MORTAR—Iron, bell shape,** heavy; with pestle.

Cap., pints ..	½	1	2	gals. ½	1	2
Size, inches ..	4¾x3	4¼x4	5½x5	6½x6	8x7	10½x[illegible]
Each	**.80**	**1.40**	**1.90**	**2.75**	**4.25**	**[illegible]**

4622. **MORTAR—Iron, Buck,** for grinding and amalgamating [illegible] large sample of quartz can be ground in contact with [illegible]
Diameter, inches .....
Each .....

4624. **MORTAR—Best Tool Steel,** for powdering Spiegel[illegible] inches high, 3x3 inches outside, 3½ inches deep [illegible] pestle 10 inches long, rounded end, 1⅝ inches [illegible]

4626. **MORTAR—Diamond, Plattner,** superior make [illegible]
Size .....
Diameter of pestle, inches .....
Each .....

4628. **MORTAR—Diamond, Leed,** of hardest steel [illegible]

4630

4634

4630. **MORTAR—Porcelain, shallow form,** rough inside, glazed outside; with porcelain pestle, the larger sizes set in wooden handle.

No.	8	7	6	5	4	3	2
Diameter, inches	2¼	2½	2¾	3¼	4	4½	5½
Each	**.35**	**.38**	**.40**	**.45**	**.55**	**.85**	**1.05**
No.		1	0	00	000	4–0	5–0
Diameter, inches		6	6¾	7½	8½	9½	10½
Each		**1.20**	**1.35**	**1.45**	**1.60**	**2.20**	**4.00**
No.			6–0	7–0	8–0	9–0	10–0
Diameter, inches			11½	12½	14	15	16
Each			**6.50**	**8.00**	**10.00**	**15.00**	**20.00**

4634. **MORTAR—Wedgewood style,** pestle with wooden handle.

No.	0000	00	1	3	5	7	9	12
Diameter, inches	3	3½	4½	6	7	8½	10½	14
Each	**1.00**	**1.20**	**1.40**	**1.95**	**2.70**	**3.85**	**6.00**	**9.50**

4637/1

Motors

4637/1. **MOTOR—E. & A. Universal Laboratory,** suitable for both alternating and direct current. Complete with rheostat, plug, and connecting cord **30.00**

By connecting the plug to any 110 or 220 volt circuit, no matter whether alternating or direct, any desired speed up to 2500 R. P. M. is instantly available. The rated capacity of the motor is 1/60 H. P.

A double joint permits placing the motor at any angle, horizontal or vertical, so that one motor may be used for all positions. The rheostat is mounted separately, thus reducing the bulk and permitting the motor (if removed from its base) to be attached to a retort stand or other support.

4638

4640

4638. **MOTOR—Electric,** operated by battery current. We recommend Edison Primary Batteries, cat. No. 582, to operate these motors.

Size	Ajax	No. 1	2
Each	**2.75**	**6.00**	**10.00**

4640. **MOTOR—Electric,** for direct and alternating current. These motors are of high grade efficiency, and may be absolutely relied upon for years of satisfactory service.

H. P.	Pulley		Speed R. P. M.	Direct Current shunt wound		Alternating Current single phase	
	Diam.	Face		115 V.	230 V.	110 V. 60 cy.	220 V. 60 cy.
				Price	Price	Price	Price
⅛	2″	groove	1750	**30.50**	**32.50**	**30.50**	**32.50**
⅛	2″	groove	1150	**33.00**	**34.00**	**37.00**	**38.50**
¼	3″	1½″	1750	**45.00**	**46.00**	**42.50**	**44.00**
¼	3″	1½″	1150	**50.50**	**53.00**	**44.00**	**45.00**
½	3″	2″	1750	**79.50**	**81.00**	**75.50**	**77.00**
½	4″	3″	1150	**101.50**	**103.00**	**75.50**	**77.00**
¾	4″	3″	1750	**96.00**	**99.00**	**112.50**	**112.50**
¾	4″	3″	1150	**112.50**	**114.50**	**135.50**	**135.50**
1	4″	3″	1750	**108.50**	**112.50**	**127.00**	**127.00**
1	4″	3″	1150	**132.00**	**137.50**	**160.00**	**160.00**

Above motors will carry full load continuously with a temperature rise not to exceed 40° C. All motors are furnished with pulley and in sizes ¼ H. P. and larger with sliding base. Starters are supplied on D. C. Motors ¼ H. P. and larger.

Prices on Series or compound D. C. Motors, also on A. C. Motors 25 or 40 cy. furnished on request.

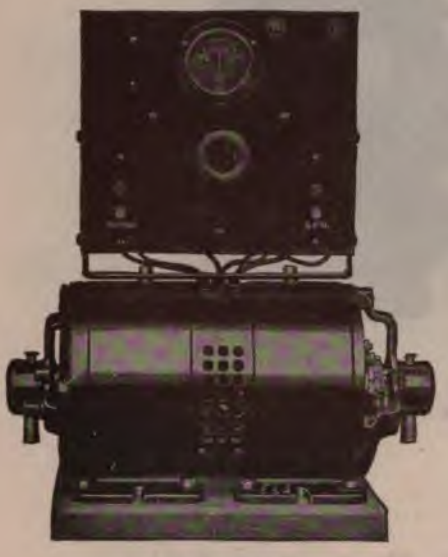
Motor Generators change from any available current and voltage to any equivalent desired current and voltage. Those from A. C. to D. C. are in most demand. Direct current is required for charging storage batteries, for electrolytic purposes, &c.

MOTOR GENERATOR—A. C. to D. C. Outfit is supplied with single phase, 60 cycle motor and switchboard. Generators are wound to give a maximum output of 10 amp. Be sure to state voltage desired, also details of your current.

For cut, see next page.

Output Watts	80	150	250
Shipping weight, lbs.	115	140	205
4641/1. For 110 volts ....each	**123.50**	**153.50**	**219.50**
4641/2. For 220 volts ....each	**124.50**	**142.50**	**203.50**

Allowance for switchboard will be made if not desired.



4641/1–4641/2

4642/1

4654

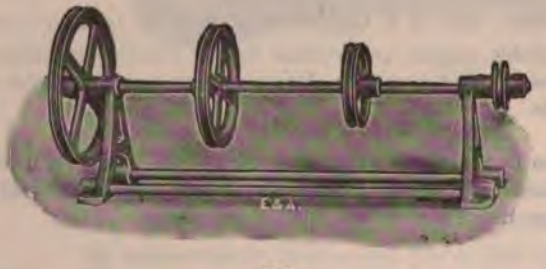
4655

4642/1. **MOTOR—for water, steam or compressed air;** this Motor can be attached to an ordinary apparatus stand and used for either stirring or shaking. Size 5 inches diameter with clamp and holder **10.50**

Revolutions attained according to water pressure from 2300 revolutions per minute at 20 pounds water pressure to 4200 revolutions per minute at 60 pounds pressure.

4654. **SPEED REDUCING GEAR**—A device by which the high speed of a motor is converted into a slow powerful motion. The round plate may be removed if desired, and direct connection made to shaft. Will serve for a wide range of speeds..... **7.00**

4655. **Ditto**—but with all gears enclosed in a case filled with grease, thus insuring silent running. Geared 48 to 1. Diameter of fast running pulley 4 inches. Diameter of slow running cone pulley 1, 1½, 2 and 2½ inches. The fast running shaft can be fitted with a pulley 8 inches in diameter or less if desired, at an extra cost according to size **10.50**



4656

4657

4656. **MOTOR COUNTERSHAFT**—Shaft and bearings for connecting engine with other machinery. Pulleys are 1, 2, 3 and 4 inches in diameter for ⅛″ or $\frac{3}{16}$″ round belt. **2.50**

4657. **MOTOR COUNTERSHAFT**—Similar to above. Pulleys 1, 1½, 2, 2½, 4 and 6 inches. Pulleys are grooved for $\frac{3}{16}$ inch round belt. Shaft ⅜ inch diameter; weight 4 pounds **3.50**

4658

4664

4662

4666

4668

Moulds

4658. **MOULD—Cupel, Steel,** best make.

Diameter, inches	1	1¼	1½	1¾	2
Each	**2.60**	**2.90**	**3.25**	**3.75**	**4.00**

4660. **MOULD—Cupel, Brass,** same shape as above

Diameter, inches	1¼	1½	1¾
Each	**4.00**	**4.85**	**5.70**

4662. **MOULD—Ingot,** with handle.

Size, inches	3x1x1	4x2¼x1½	7⅛x1x½	8½x3x1	9x3x2
Each	**1.10**	**1.60**	**1.80**	**2.40**	**3.60**

4664. **MOULD—Pouring,** of iron, with handle **2.00**

4666. **MOULD—Pouring,** of iron, with handle.

Cavities	6	9	12
Each	**.75**	**1.00**	**1.25**

4668. **MOULD—Pouring,** of iron, with handle and 32 spherical depressions **8.00**

4670

4672

4670. **MOULD—Pouring,** of iron, with handle; conical cavities.

Cavities	3	6	12
Each	**1.00**	**1.25**	**1.60**

4672. **MOULD—Pouring,** of heavy solid iron, with two handles, and 6 conical cavities **3.20**

4674

4676

4674. **MOULD—Pouring,** of iron, no handle; with 25 spherical depressions **1.25**

4676 **MOULD—Fletcher, Melting arrangement,** with blowpipe combined; for rapidly obtaining ingots of gold, etc., without the use of a furnace. Complete **4.00**

4682

Muffles

4682. **MUFFLE—Clay, Denver make.** Dimensions are outside.

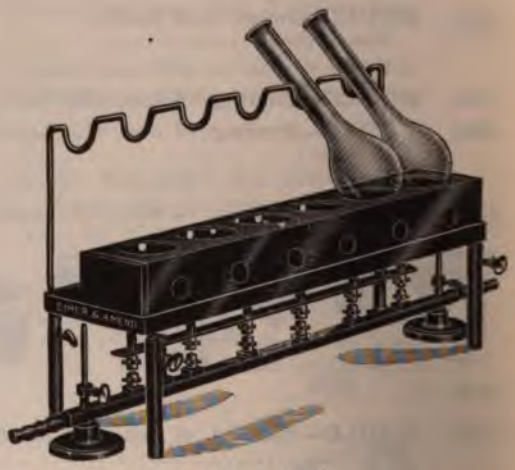
No.	AA	C	H	J(high)	KK(high)	LL(high)	GI	QQ	NN
Length, in..	7	8	10½	12	12	15	16	18	19
Width, in...	3	4¾	5¼	6	8	9	10	12¼	10½
Height, in..	2¼	3	3⅞	4	5	5¾	5½	7¾	6½
Each	**1.35**	**1.60**	**2.25**	**2.50**	**3.25**	**4.00**	**4.75**	**6.50**	**5.50**

4688. **MUFFLE—Fused Silica,** will stand sudden and extreme changes of temperature. See note.

4690. **MUFFLE—Alundum,** rectangular or D shape; especially serviceable because of their high thermal conductivity for use with furnaces heated by electricity.

Note:—We have on hand a stock of various sizes and shapes of fused silica and of alundum muffles. We have not attempted, however, to list these muffles owing to the great variety of shapes and sizes in use in the industries. Send us your specifications. We may be able to supply the muffle desired from stock. If not, we shall be glad to secure a suitable muffle as promptly as possible from the factory.

4700–04



4706 & 4712

Nitrogen Determination Apparatus

4700. **KJELDAHL DISTILLING APPARATUS**—Consisting of a polished heavy copper condenser, tin lined, 30 inches long, fitted with six block tin condensing coils; distilling shelf of iron, with 6 burners, each with long key stopcock (to prevent burning the fingers when turning down the flame); **without glass parts** **90.00**

4702. **Condenser only**—of copper, with 6 block tin condensing coils **50.00**

4704. **Condenser**—of zinc, with 6 block tin coils **33.00**

4706. **Distilling or Digestion Shelf only**—with 6 burners **40.00**

4708. **KJELDAHL DISTILLING APPARATUS**—Same as above, with condenser 46 inches long, fitted with 10 condensing coils, and distilling shelf with 10 burners; **without glass parts** **140.00**

4710. **Condenser only**—of copper, with 10 block tin condensing coils **83.00**

4712. **Distilling or Digestion Shelf only**—with 10 burners **56.00**

4714–16

4714. **KJELDAHL DIGESTION SHELF—Johnson, Conn. Agricultural Experimental Station pattern.** Made of heavy cast iron; the holes having projections shaped to support Kjeldahl flasks, are 4½ in. apart from center to center. The flasks are supported by resting their necks in a large lead pipe connected with the flue, for carrying away the fumes. Complete with burners, each with stopcock; **without flasks or lead pipe.**

For flasks	6	10	13
Length, inches	29	46	60
Price	**32.50**	**38.50**	**42.00**

4716. **Lead Pipe**—4 in. diam., with holes for use with above shelf, bent at end; length of bent part about 10 inches; with adjustable support.

For flasks	6	10	13
Price .....about	**26.50**	**36.00**	**42.00**

We can furnish the lead pipe of other sizes, and bent at any angle desired. Prices on application with specifications.

4718–20

4722–26

4718. **KJELDAHL DISTILLING APPARATUS**—The most convenient form can be made to hang on the wall, or with support to stand on the table. Comprises a polished heavy copper condenser with block tin condensing tubes, support for flasks, set of E. & A. adjustable burners for use with natural illuminating or gasoline gas. Arranged to hang on the wall; **without glass parts.**

With burners	6	12
Price	**87.50**	**165.00**

4720. **Ditto**—Arranged to stand on the table; **without glass parts** **87.50** **165.00**

4721. **Set of Glass Parts** for above **10.25** **20.50**

4730

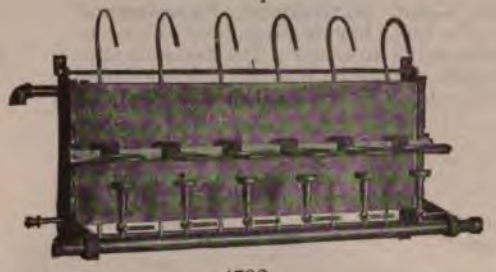
4722. **KJELDAHL DISTILLING APPARATUS**—Consisting of a polished heavy copper condenser, tin lined, 30 inches long, fitted with 6 block tin condensing coils; distilling shelf of iron with 6 burners, complete with 6 Pyrex Erlenmeyer flasks 750 cc., bulb connecting tubes and rubber stoppers. For cut, see preceding page **85.00**

4724. **Condenser only**—of copper, with 6 block tin condensing coils **52.00**

4726. **Distilling Shelf only**—with 6 burners **25.00**

4730. **KJELDAHL DISTILLING APPARATUS—Wagner form,** complete as illustrated; without burners and glass parts.

For determinations	2	4	6
Each	**15.00**	**20.00**	**30.00**

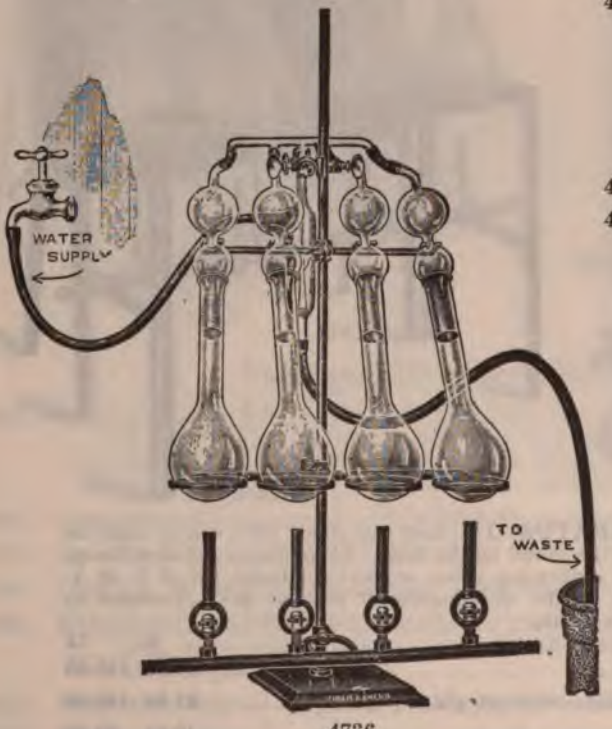


4732

4734

4732. **KJELDAHL DISTILLING APPARATUS—Folin,** combining simplicity, compactness, effectiveness of cooling, and neatness of appearance.

For Flasks	6	12
Price	**68.00**	**112.00**



4736

4734. **KJELDAHL DIGESTING SHELF—Folin.** A simple and improved digesting shelf with burner and bulb rack. Individual neck supports furnished if desired at extra cost; with six burners **29.25**

4735. **Ditto**—with 12 burners **48.75**

4736. **THE SY FUMELESS DIGESTION APPARATUS**—Complete as illustrated, with 4 Pyrex Kjeldahl flasks 500 cc., with rubber tubing for connecting pump to faucet.. **25.00**

ELECTRIC HOT PLATE—Specially designed for heating Kjeldahl flasks, see No. 3855.

FOLIN'S FUME ABSORPTION APPARATUS, for urine analysis, see Urine Analysis Apparatus.

KJELDAHL'S FLASKS, Glass and copper, see Flasks.

KJELDAHL'S CONNECTING BULBS, see Bulbs.

NITROGEN BULBS—See Bulbs.

4738 4740 4742 4744 4746 4748

4738. **NITROGEN APPARATUS—Devarda,** modified, for the analysis of nitrate of soda (Eighth International Congress of Applied Chemistry—Original Communications, Vol. 1, p. 19). Apparatus as illustrated, with ground joints, and two extra flasks ground to fit **10.00**

4740. **NITROMETER—Allen,** graduated to 50 cc. in 1/5th cc., with graduated cup, and plain leveling tube **6.00**

4740a. **Leveling tube only** ..... **.50**

4742. **NITROMETER—Lunge,** with plain leveling tube.

Graduated	50 cc. in 1/5th	50 cc. in 1/10th	100 cc. in 1/5th
Each	**4.60**	**5.25**	**5.75**

4744. **NITROMETER—Lunge,** with patent double bored stopcock and plain leveling tube.

Graduated	50 cc. in 1/5th	50 cc. in 1/10th	100 cc. in 1/5th
Each	**5.50**	**6.25**	**6.75**

4746. **NITROMETER—Lunge.** Especially suitable for nitro-glycerine, dynamite, etc., where it is desirable to liberate and measure a larger volume of nitric oxide than is practicable in the ordinary nitrometer. The tube graduated 100 cc. to 140 cc. in 1/10th, with graduated leveling tube **9.00**

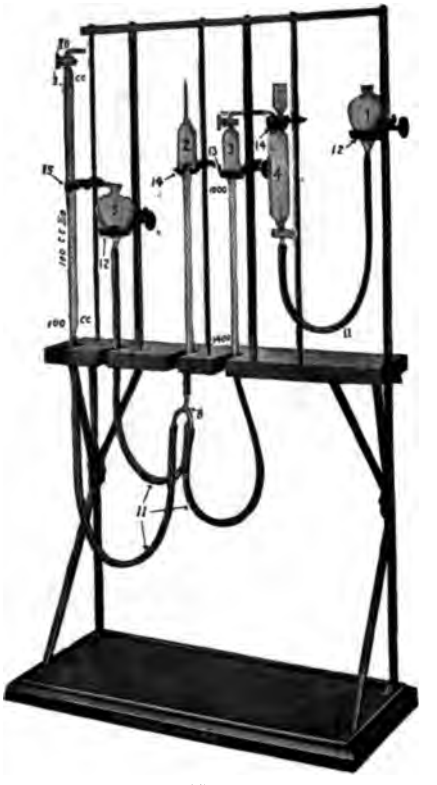
4748. **NITROMETER—Lunge.** With patent double bored stopcock; graduated 130 cc. in 1/5th, with plain leveling tube **10.00**

4750 4751 4752

4750. **NITROMETER — Schiff,** graduated to 100 cc. in 1/5th cc., mounted on support with reservoir, clamp and connections as illustrated, but with adapter end **10.00**

4751. **NITROMETER — Bradley,** graduated 50 cc. in 1/5, with graduated funnel top; especially adapted for the assay of spirit of nitrous ether; see Journal Amer. Pharm. Assoc., October, 1914, p. 1442 **8.50**

4752. **NITROMETER — Knopp & Wagner,** complete with burette 50 cc., in 1/5th **22.50**



4754

4754. NITROMETER—duPont (Jour. Soc. of Chem. Industry, 1900, p. 182). A most rapid and accurate apparatus for the analysis of nitric acid and mixed acids, used by many manufacturers of explosives, etc. The rectangular iron frame support has six uprights.

The compensating burette is supported by a ring; the generating bulb is supported just above each stopcock by forked holders, curved so as to retain the bulb in place. In order to remove the generating bulb it needs only to be raised slightly and brought forward, the manipulation of a screw, as in the case of an ordinary clamp, being thus avoided. The two reservoirs and the reading burette are supported by ring clamps, these clamps having milled rollers at the shank; they are moved up and down vertical racks by means of hand screws, the rollers being so arranged in conjunction with the vertical racks that the weight of the part presses them down and acts as a brake, thus preventing their moving when not being manipulated.

The stand is arranged to fasten to the floor, and provided with wood table, attached in convenient height for working; complete with glass parts as illustrated **105.00**

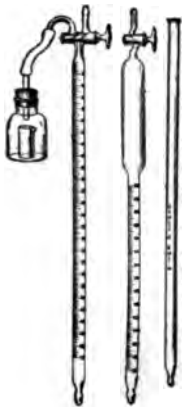
4755. Stand—for above, without glass parts **80.00**

4756. Set of glass parts for above **25.00**

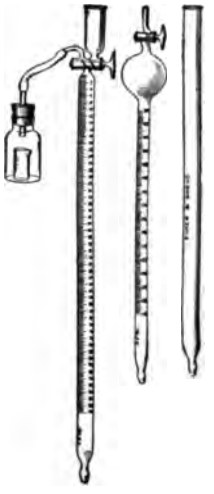
4757. Set of iron clamps and rings for above **24.00**

4758. Separate glass parts.

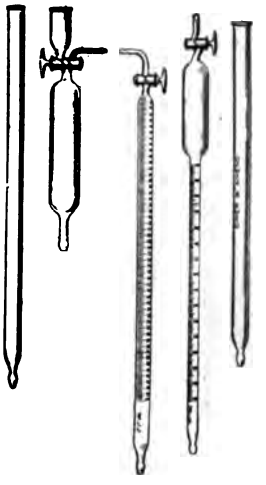
No. 1 & 5 Leveling Bulbs (Reservoirs) ..... each		1.20
No. 2 Compensating Tube		2.00
No. 3 Nitrogen Bulb Tube or Reading Burette		6.50
No. 4 Reaction or Generating Bulb		8.00
No. 8 Four-way Connecting Tube		.50
No. 10 Measuring Tube or Universal Tube		6.50
No. 11 Rubber Tube connections		4.75
No. 12 Two large ring clamps with milled rollers and pinion	each	7.00
No. 13 One small ring clamp with milled roller and pinion		6.00
No. 14 Two Forks	each	2.00
No. 15 One round medium Clamp with fastener		.65



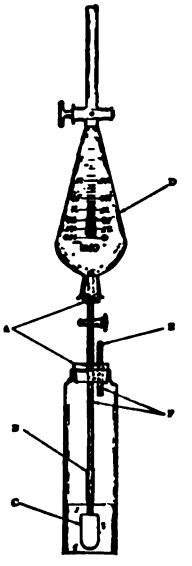
4760



4762



4764



4764/1

Gas Volumeters

Lunge (see Lunge's Technical Gas Analysis) **for direct reading of the volume of gas, requiring no correction for temperature and pressure. Provided with patent stopcocks.**

4760. VOLUMETER—For the analysis of Pyrolusite, Chloride of Lime, and other difficultly soluble substances. The measuring tube graduated 50 cc. in 1/10ths, reduction tube 100–130 cc. in 1/10ths; with plain leveling tube **14.00**

a. **Decomposing Bottle** **1.75**
b. **Reduction Tube** **6.00**
c. **Measuring Tube** **6.00**
d. **Leveling Tube** ..... **.75**

4762. VOLUMETER—For the analysis of both difficultly and readily soluble substances as Pyrolusite, Chloride of Lime, Charcoal, Carbonates, Nitrates, etc. The measuring tube graduated 100 cc. in 1/5ths, reduction tube 100–130 cc. in 1/10ths; with plain leveling tube **15.25**

a. **Decomposing Bottle** **1.75**
b. **Reduction Tube** **6.50**
c. **Measuring Tube** **6.75**
d. **Leveling Tube** ..... **.75**

4764. VOLUMETER—For carrying on the nitro-metrical operation in separate vessels; for Nitre, Nitrose, Nitrocellulose and Dynamite. The measuring tube graduated 100 cc. in 1/5ths, reduction tube 100–130 cc. in 1/10ths with developing flask, and 2 plain leveling tubes **17.50**

a. **Leveling Tube** ..... **.75**
b. **Generator (Decomposing Vessel)** **5.50**
c. **Reduction Tube** **6.00**
d. **Measuring Tube** **5.75**

4764/1. VOLUMETER—Anaerobic Culture, as designed by Zae Northrup of Michigan Agricultural College, for determining, qualitatively and quantitatively, the gases produced by fruits and vegetables. (See Jour. of Ind. Eng. Chem., Vol. X, No. 8, Aug. 1, 1918, page 624) **12.00**

VAN SYKE APPARATUS—see No. 7249.

See also Gas Analysis Apparatus.

4765 4768 4769 4769/1–4769/4 4770

Oil Testing Apparatus

Flash Point Apparatus, Viscosimeters for Oils, Etc.

4765. **OIL TESTER—Abel-Pensky, U. S. Bureau of Mines model** (see Technical Paper No. 49, Bureau of Mines) **for flash point of illuminating oils;** with clockwork attachment to open the cover of the oil cup and to depress the test flame. Complete in portable case, with thermometers **135.00**

4765a. **Aneroid Barometer** .....**extra** **15.00**

4766. **OIL TESTER—Abel-Pensky,** standard imported model, complete with aneroid barometer **125.00**

4768. **OIL TESTER—N. Y. State Board of Health pattern, for flash point of illuminating oils.** Adopted as a standard by many states; with accurate thermometer and oil lamp **15.50**
Bunsen Burner ..... **.75**

4769. **OIL TESTER—Open,** for flash and fire tests of illuminating oil, with standard thermometer. Equipped with Gas Flame Testing Burner. The flame from the Gas Burner can be regulated by stopcock. The Testing Burner is used with wheel for the dip test; without wheel for the bar or cross test **10.00**

4769a. **Gas Flame Testing Burner**—with wheel, stopcock, and hose **3.00**

4769/1. **OIL TESTER—Standard** for flash and fire tests of illuminating oils, with standard thermometer 50° to 170° F. **32.40**

4769/2. **Ditto**—for flash and fire tests of illuminating oils, with standard thermometer 80° to 250° F. **32.40**

4769/3. **Ditto**—for flash and fire tests of lubricating oils, 80° to 400° F., with Bunsen burner and thermometer **38.90**

4769/4. **Ditto**—for flash and fire tests of lubricating oils, 200° to 600° F., with Bunsen burner and thermometer **38.90**

4770. **OIL TESTER—Cleveland Open Fire, for flash point of lubricating and heavy oils.** Substantially made of brass, with accurate thermometer reading to 600° F., and spirit lamp **15.00**
Bunsen Burner .....**extra** **1.00**

4771

4773

4775

4771. **OIL TESTER—Pensky-Martin, U. S. Bureau of Mines model** (see Technical paper No. 49, Bureau of Mines), **for flash point of heavy oils.** The apparatus consists of an oil cup with cover fitted with thermometer and stirrer, and an air bath. The bath may be heated by a gas flame or spirit lamp, and the slow and regular heating of the oil is ensured by the jacket of air that surrounds the cup; complete in portable case with standard thermometers **125.00**

4772. **Ditto—Standard Imported model,** complete in portable case **100.00**

4772/5. **NAVY FUEL TESTING OUTFIT**—Consisting of Pensky-Martin Flash Point Tester No. 4771, Oil lamp hydrometers, thermometers, stirring devices, measuring glasses, burning fluid containers, sediment apparatus and filtering apparatus in hard wood cabinet with lock and handle **240.00**

4773. **OIL TESTER—Saybolt,** for flash and fire tests of illuminating oils only **84.00**

a. **Dry batteries**—for use with above, extra .....**price on application**

b. **Ruhmkorff coil**—for use with above ¼", extra .....**price on application**

c. **Electric switch and wires**—for use with above, extra .....**price on application**

4774. **OIL TESTER—Gray, improved form, for heavy mineral oils;** testing to 700° F. (See Journal Soc. Chem. Ind., April, 1891, p. 348.) Complete in portable case, with nitrogen filled accurate thermometer to 700° F. **105.00**

4775. **OIL TESTER—Closed,** for flash point, complete with two **Fahrenheit** thermometers.. **60.00**

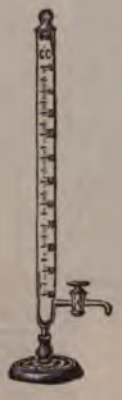
4775/1. **Ditto**—but supplied with **Centigrade** thermometers **60.00**

Thermometers extra .....**each** **3.33**

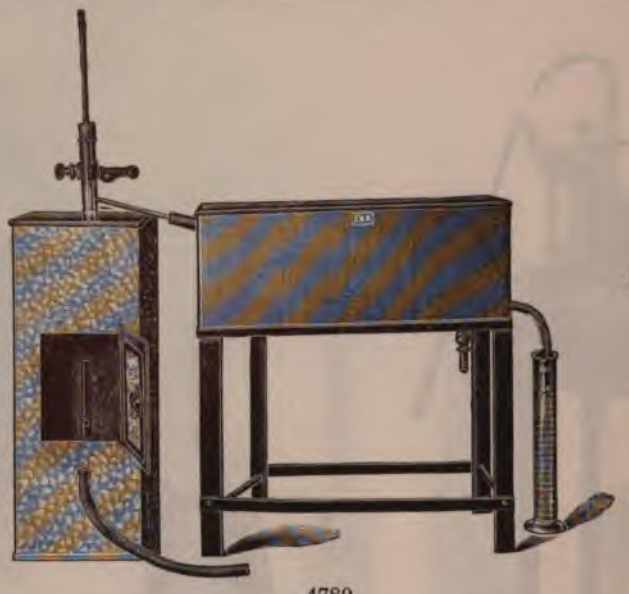
4780. **OIL TESTER—Thurston,** for testing the value of lubricating oils, their durability, lubricating quality, and liability to gum. Complete **200.00**

The machine consists of a pendulum hung from a bearing on a shaft, rotated by means of a pulley. The pressure is caused by a spiral spring inside the pendulum and can be regulated by means of a milled head screw. The pressure per square inch, also the total pressure, are indicated on the index plates. The total friction can be read on the scale of the arc. A thermometer fitted in the upper brass indicates the temperature.

4784



4786



4789

4790

4784. **OIL CYLINDER—Graefe,** graduated in cc., for determining water in fuel oil; as used by the U. S. Navy; on glass foot **1.75**

4786. **OIL TUBE—Muter,** graduated to 250 cc., mounted on wooden base **6.50**

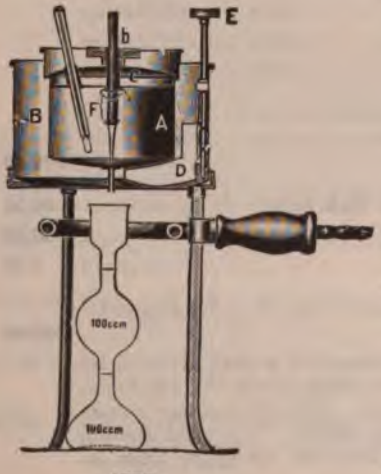
4789. **OIL TESTER—Distillation Apparatus,** for determining boiling and end points of gasoline, petroleum oils, and paint thinners, as recommended by the U. S. Bureau of Mines. Complete **60.00**

Accessories

a. **Burner**—Alcohol Lamp, for use when gas is not available **9.00**
b. **Condenser**—Made of polished copper with stopcock for draining, mounted on iron support **29.00**
c. **Flask—Distilling, Engler,** see **Flasks.**
d. **Guard**—For burner, of galvanized iron lined with asbestos **26.50**
e. **Thermometer**—Special, graduated to read 0–270° C. **6.00**
f. **Thermometer**—Graduated to read 520° F. **6.00**
g. **Asbestos Mat**—5 inches square, for shielding sides of flask ..... **.50**

4789/1. **OIL TESTER**—Same as No. 4789, but with electric heater **92.00**
a. **ELECTRIC HEATER**—for above **33.00**

Viscosimeters



4792

4790. **VISCOSIMETER—Engler, latest form, for light and heavy oils,** etc. The instrument consists of oil container, gold plated inside, with platinum outlet, surrounded by a brass water bath; two standard thermometers, one to 150° C. and the other to 50° C., graduated flask, tripod with ring burner; complete **75.00**
a. **Flask**—with one mark **1.50**
b. **Flask**—with two marks, 200 and 240 cc. **1.75**
c. **Thermometer**—0–50° C., without Certificate **3.00**
d. **Thermometer**—0–150° C., without Certificate **3.00**

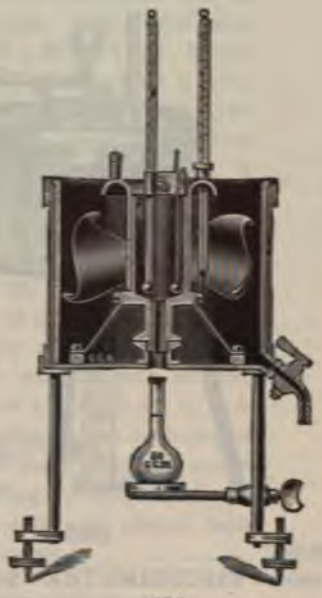
4791. **VISCOSIMETER**—Same as No. 4790, but electrically heated .....**price on application**

4792. **VISCOSIMETER—Engler, modified by Ubbelohde,** with air space in lid, and stirring arrangement in the bath, to keep the temperature constant, increasing the accuracy of the determinations; complete with thermometers, etc... **95.00**
a. **Flask**—with two marks and two bulbs **1.75**
b. **Thermometer**—0–50° C., without Certificate **3.00**
c. **Thermometer**—0–150° C., without Certificate **3.00**

4793. **VISCOSIMETER**—Same as No. 4792, but electrically heated .....**price on application**

4796

4798



4800

4796. **VISCOSIMETER—Doolittle, Universal Torsion,** recommended for light and heavy oils, varnishes, paints, starch and viscous materials either with or without pigments. The viscosity can be measured at any temperature, and therefore at the temperature at which the liquid is to be used. Dirt or solid particles in the liquid do not impair the accuracy of the results. Complete as illustrated. Bulletin on request ... **150.00**

VISCOSIMETER—Bingham & Green, see No. 7365.

VISCOSIMETER—MacMichael, Improved, see No. 7367.

4798. **VISCOSIMETER—Sir Boverton Redwood, for light and heavy oils.** The instrument is supported on a tripod stand, complete with flasks, thermometers, and designer's certificate of accuracy.

The instrument consists of a silvered brass oil-cylinder, with an agate jet, surrounded by a copper bath. A copper tube, closed at the lower end, projecting at an angle of 45° from the side of the bath, provides a means of heating the bath liquid, and by the use of the revolving agitator, the heated liquid rising from the copper tube is uniformly distributed through the bath. The agitator carries a thermometer to indicate the temperature of the bath. The oil-cylinder is furnished with a stopper, consisting of a small brass sphere attached to a wire, the sphere resting in a hemispherical cavity in the agate jet **110.00**

4803

4800. **VISCOSIMETER—Sir Boverton Redwood, Admiralty Type, for fuel oils,** complete with flasks, thermometers, and certificate of accuracy **210.00**

4803. **VISCOSIMETER—Stormer,** a simple apparatus constructed upon the principle of driving a cylinder through the liquid under examination, with a constant weight and at a known temperature. Requires only a 50 cc. sample **48.00**

4804

4805

4804. **VISCOSIMETER—Scott, for thin or viscous liquids,** with accurate thermometer, 50 cc. graduated cylinder, and instructions for operation **22.50**

For viscosity of lubricating oils, an accurate thermometer graduated in 1/5° F., 50–120° F. is recommended. Extra **3.50**

4805. **VISCOSIMETER—Saybolt Universal, Improved model,** for testing cylinder, valve and similar oils with bath at 212° F.; for reduced black oils with bath and oil at about 130° F., and neutral, spindle, paraffin, red and other distilled oils with bath and oil at 100° F. or at any temperature from 70° to 212° F. The instrument is furnished with electric heating element with cord and plug, also with gas heating arrangement and U tube steam heated, so that either one can be used as may be desirable. Complete as illustrated with flask and six thermometers; without stopwatch **90.00**

a. **Stopwatch** ..... **extra** **10.00**
b. **Extra Flask** graduated, 60 cc. capacity **1.50**
c. **Extra Thermometers** ..... **each** **3.00**

4810. **VISCOSITY PIPETTE—Dudley,** as used by the Pennsylvania railroad; delivers 100 cc. of water at 100° F. in 34 seconds **1.25**

CALORIMETERS—for testing heating value of oils, see **Calorimeters.**

CENTRIFUGES—see **Centrifuges.**

COLORIMETERS—see **Colorimeters.**

FLASKS—Engler, Hempel, etc., see **Flasks.**

HYDROMETERS—see **Hydrometers.**

OIL BOTTLES—see Nos. 1060 to 1062.

OIL HYDROGENATION APPARATUS—see **Autoclaves.**

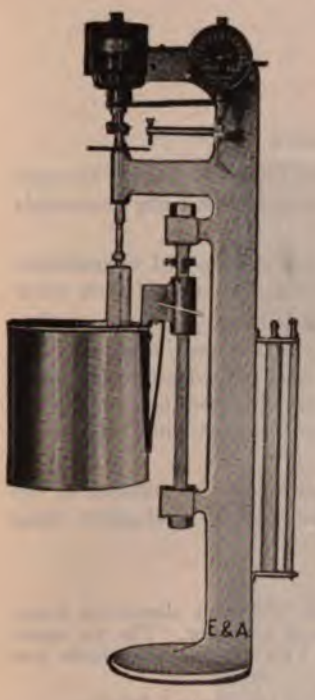
SEPARATORY FUNNELS—see **Funnels.**

STILLS—Oil (Brown, etc.), see **Distilling Apparatus.**

TINTOMETERS—see **Colorimeters.**

THERMOMETERS—see **Thermometers.**

See also **Bituminous Materials Testing Apparatus.**



4814

4814. **OIL EMULSION MACHINE—U. S. Naval Engineering Experiment Station design, E. & A. improved.** For the **Herschel Demulsibility Test.** The oil and water to be emulsified are contained in an ordinary commercial 100 cc. graduated cylinder, 26 mm. inside diameter. A bath is provided for maintaining the contents of the cylinder at a temperature of 55° C., both during the stirring and subsequent settling out of the oil from the emulsion. The paddle used in stirring is a copper plate 89 x 20 x 1.5 mm. Means are provided for revolving this paddle about a vertical axis parallel to and midway between its two longer edges, and for keeping the speed constant at 1500 r. p. m. There is a holder for the cylinders. A stop is provided so that when the paddle is lowered into the cylinder (or bath raised), the distance from the bottom of the paddle to the bottom of the cylinder will be about equal to the depth of the top of the paddle below the surface of the liquid. The bath is large enough to contain five additional samples to be tested. The apparatus is provided with an electric heater. Special features of the improved E. & A. type are the arrangement whereby the bath moves up and down instead of the motor, and the governor for the motor, thus insuring accurate speed control at 1500 r. p. m. Complete with electric heating arrangement and six cylinders **250.00**

Method of Operation

Pour 20 cc. of the oil to be tested and 40 cc. of distilled water into a cylinder, place cylinder in bath and heat to 55° C. Submerge the paddle and run it for 5 minutes at a speed of 1500 r. p. m. Stop the paddle, withdraw it from the cylinder and use the finger to wipe off the emulsion clinging to the paddle and to return it to the cylinder. Wipe off the paddle with paper so that it will not contaminate the next sample. Keep the temperature of the cylinder constant at 55° C. and take readings every minute of the position of the line of demarcation between the topmost layer of oil and the adjoining emulsion. The first reading is taken one minute after stopping the paddle. With oils which act normally, the rate of settling out of the oil increases up to a maximum and then decreases, and the maximum value, in cc. per hour, is called the "demulsibility" and is recorded as the numerical result of the test. Each rate of settling is the average rate calculated from the time of stopping the paddle to the time of reading.

For thermometers and other accessories, see appropriate headings.

Note:—No. 4814 Emulsion Machine was designed primarily for steam turbine oils which should not emulsify in use. It does not apply to transformer oils as they all give a demulsibility of 1200 and so cannot be distinguished, nor does it apply to marine engine oils, all of which give a demulsibility of zero. With oils having a Saybolt viscosity of over 50 seconds at 100° C. there is apt to be difficulty and the test is not recommended. The abnormal manner of settling out which indicates failure of test, may be distinguished from the normal settling as follows: with normal settling, at the moment when the paddle is stopped, all the water has entered into the emulsion, and in the case of oils of zero demulsibility there remain 60 cc. of emulsion at the end of the hour. With other oils, sooner or later there appears a layer of oil above the emulsion, and this layer gradually increases in thickness so that the line of demarcation between oil and emulsion gradually (or in the case of oils of high demulsibility, *rapidly*) descends. With abnormal settling, all the water does not enter into the emulsion, no line of demarcation between oil and emulsion is visible, the ragged line of separation between the water and the emulsion ascends very rapidly part way to the 40 cc. mark, and very slowly for the rest of the way, if indeed it does ascend the rest of the way during the hour. The oil is broken up into large drops which may adhere to the walls of the cylinder, or the contents of the cylinder below the 40 cc. line may consist mainly of these drops honeycombed with water.

Ovens

The Freas Electric Oven

(Patented)

Approved by the National Board of Fire Underwriters

The Freas Electric Constant Temperature Oven has become widely and favorably known throughout the world for its durable construction, reliability and accuracy. It is recognized as being thoroughly satisfactory for long, continuous, and unattended operation.

The Oven is always ready for use, and is easily and quickly regulated for any desired temperature. This feature alone has enabled many laboratories to increase greatly the scope and volume of their work.

The varied application of the Oven is indicated by its general use for laboratory drying, as filter paper, etc., and for determining the total solids in foods; moisture in wheat, sugar, coal, ores, etc., also oxidizing qualities of linseed oil products; drying qualities of paints, varnishes, and enamels; evaporating tests of asphalt; life tests of rubber; experimental baking; botanical investigations, etc., etc. It is used with much satisfaction as a combined Drying Oven, Incubator, and Sterilizer; but when an Incubator only is desired, the Freas Electric Incubator is recommended.

Sugar chemists, for example, require the Freas to enable them to maintain their laboratories at the low temperature needed for their work. The Freas gives the maximum of heat within the chamber, using a minimum of current.

Construction

The Oven is constructed with a double wall of heavy asbestos transite, with cast aluminum frame and door. The asbestos transite is absolutely fireproof and an excellent heat insulator. The air space between the inner and outer asbestos walls is filled with air-cell asbestos. This permits very little loss of heat, thus reducing the current consumption to a minimum.

The interior is fitted with shelf racks, allowing the shelves to be placed at any desired height.

A small electric lamp is placed within the Oven. This lamp is used for illumination and as a pilot if desired. It can be lighted at will. By means of a small window in the door, the contents can be observed without opening the door, as this would cool the contents of the chamber.

There are openings on each side of the Oven, one near the top and one near the bottom, for ventilation.

The Freas Regulator is the most important feature of this Oven. It is made entirely of metal, of exceptionally durable construction. It is dependable and practically cannot get out of order. Its action depends on the expansion of a metal tube extending from bottom to top of chamber operating a lever which "makes" and "breaks" a contact without arcing.

The lever is extended and serves as an indicator, operating on a graduated temperature scale, which is on the outside of the Oven. The indicator is moved to the temperature desired by means of a milled head screw placed at the bottom of the temperature scale.

The regulation is sharp and accurate to within a fraction of a degree and remains so indefinitely.

The new type Freas Regulator is constructed so that no vapor from evaporating residues can reach the contact points.

The temperature range of the Oven is from that of the room to 180° C., and in the case of the High Temperature Ovens, to 260° C. The Freas Regulator operates just as accurately at the lower as at the higher temperatures; but to obtain the greatest accuracy at low temperatures a low wattage heating plate should be used.

The heating element consists of a wire wound resistance plate situated on the bottom of the Oven. This heating plate can be easily removed if necessary.

The heating element is wound for 600 watts, about 250 watts being required to maintain a temperature of 105° C.

The following are some of the distinctive features of the Freas Electric Oven which strongly recommend its use:

(1) Approved by the National Board of Fire Underwriters after examination and tests conducted under the standards of the National Electrical Code.
(2) Accuracy and dependability of the Freas Regulator, which will maintain the desired temperature to within a fraction of a degree for an indefinite length of time.
(3) Ease of adjustment for the desired temperature. Adjusted by simply turning a milled head screw. (Contrast this with the time required to set a mercury or other regulator of the most advanced type.)
(4) To operate, merely connect with the electric circuit and turn on the current.
(5) Dependable for long continuous and unattended operations.

These are some of the reasons why Freas Ovens are placed in the most important laboratories of the leading educational and commercial institutions of the world.

FREAS REGULAR OVEN No. 140, on heavy base with legs, without Center Column

No. 136 is the same as No. 140, except in size

4816
No. 100

4818
No. 104

4816. **OVEN—Freas Electric, Regular (Type R),** for temperatures up to 180° C.

The Type R Freas Electric Oven is the one regularly used for moisture determinations of all kinds. It is also regularly used for sterilizing purposes. The No. 100 is the popular size but there is an increasing demand for the larger sizes.

The Type R Oven is intended for temperatures to 180° C. Each Oven is furnished with a flexible cord and plug to fit the socket of the ordinary lighting circuit, also with a high grade thermometer of special design and long stem, on which the graduations are etched to 200° C.

No.	Size of Chamber W. L. H.	Equipment	Price
100	12″ x 12″ x 12″	Cast-iron base to stand on table	**135.00**
108	16″ x 14″ x 16″	Heavy base with legs	**245.00**
110	14″ x 17″ x 18″	" " " "	**265.00**
136	26″ x 14″ x 20″	" " " "	**330.00**
140	32″ x 18″ x 22″	" " " "	**400.00**

4816a. **Special thermometer**—with long stem and graduations to 200° C., if ordered separately **3.50**

4818. **OVEN—Freas Electric, High Temperature (Type HT),** for temperatures up to 260° C.

The Type HT Freas Electric Oven is identical with Type R, with the exception that it is provided with two "heat" switches, one of which can be turned "off" when the desired temperature has been reached.

The Type HT Oven is largely used in making baking tests on bread and other food, testing asphalt, enamels, rubber, high flash point oils, etc. Also used for complete sterilizing.

Each Oven is supplied with a high grade thermometer of special design and long stem on which the graduations are etched to 300° C.

No.	Size of Chamber W. L. H.	Equipment	Price
104	12″ x 12″ x 12″	Cast-iron base to stand on table	**165.00**
114	14″ x 17″ x 18″	Heavy base with legs	**285.00**

4818a. **Special thermometer**—with long stem and graduations to 300° C., if ordered separately **4.00**

When ordering, be sure to state voltage of your current.

4821
No. 102

4821/1

4821. OVEN—Freas Electric, Combination (Type C), for temperatures up to 180° C.

This type is equipped with a removable inside glass door and a low wattage heating plate in addition to the regular heating plate. This allows the Type C Oven to be used as a combined drying Oven and Incubator. When equipped with the inside glass door and low wattage heating plate, it is similar to a Freas Electric INCUBATOR with temperature range from that of the room to about 70° C.

When used as a drying Oven with the high wattage heating plate, the range of temperature is from that of the room to 180° C.

Each Oven is supplied with a flexible cord and plug to fit the socket of the ordinary lighting circuit, and with a high grade thermometer of special design and long stem on which the graduations are etched to 200° C. See No. 4816a.

No.	Size of Chamber W. L. H.	Equipment	Price
102	12″ x 12″ x 12″	Cast-iron base to stand on table	**160.00**
112	14″ x 17″ x 18″	Heavy base with legs	**265.00**

4821/1. OVEN—Freas Electric, Revolving Shelf (Type RS), for temperatures up to 180° C.
For 110 volts **240.00**

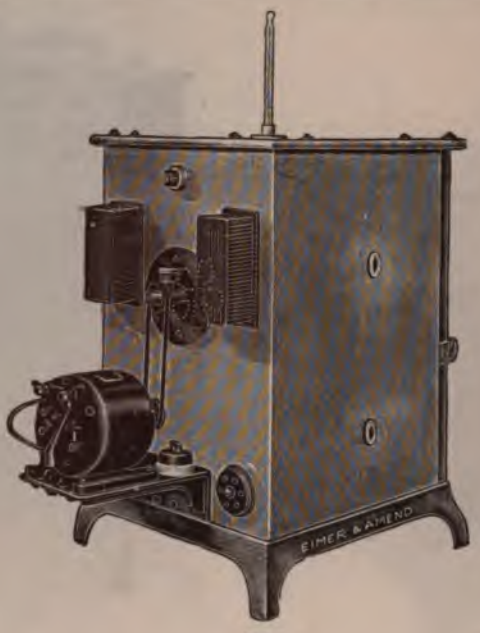
4821/2. Ditto—for 220 volts ..... **price on application**

Type RS consists of Oven No. 100, size of chamber 12″x12″x12″, fitted with a cast aluminum perforated plate. This plate is revolved in the oven chamber by means of a motor, with equipment as shown in the illustration. This arrangement subjects the various samples to be tested (which are placed on the revolving shelf) to the same uniform, constant temperature conditions. No thermometer is supplied with this oven. This oven has been adopted by the American Society for Testing Materials as the standard oven for the testing of road materials, see No. 188.

When ordering be sure to specify voltage of your current. If current is A. C., specify also number of phases and cycles.

4821/5. OVEN—Freas Constant Humidity, similar to the regular Freas Ovens, but arranged for maintaining constant humidity as well. To order only. Advise requirements.

Note:—All Freas electric ovens can be specially wired, if desired, for temperatures up to 260° C. For ovens listed to 180° C. there is an extra charge to wire for temperatures up to 260° C.



4822

4822. **OVEN—Freas Electric, Forced Air (Type FA).**

Type FA is of particular advantage for drying samples containing considerable moisture, or a large number of samples simultaneously. It is identical with Type R, but is provided with a flue in the back wall above which is placed a centrifugal fan driven by a motor supported on the outside of the oven. This arrangement provides forced circulation of heated air and a forced withdrawal of moisture-laden air, thereby creating more perfect conditions and shortening the time required for the drying operation. The FA Ovens are supplied with special Freas thermometer, graduated to 200° C., except No. 105 which has thermometer to 300° C.

No.	Size of Chamber W. L. H.	For Temperature To	Price
101	12″ x 12″ x 12″	180° C.	**225.00**
105	12″ x 12″ x 12″	260° C.	**245.00**
109	12″ x 14″ x 16″	180° C.	**330.00**
137	26″ x 14″ x 22″	180° C.	**415.00**

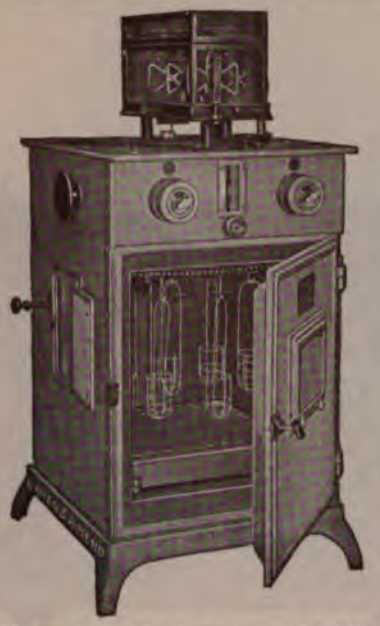
When ordering Freas Forced Air Ovens state voltage. If current is A. C., state number of phases and cycles.

Prices of FA Ovens are liable to vary, owing to the changes in prices of motors.

Extra Parts for Freas Apparatus

Regular Thermometer	**3.50**	Heating Plate for No. 140	**19.00**
High Temperature Thermometer	**4.00**	Heating Plate for No. 104	**7.50**
Heating Plate for Nos. 100, 101, 102, RS or RV	**6.00**	Heating Plate for No. 114	**10.00**
Heating Plate for Nos. 108 and 109	**8.00**	Heating Plate for LV Oven	**16.00**
Heating Plate for No. 110	**8.00**	Contact Points ....per set	**1.00**
Heating Plate for Nos. 136 and 137	**16.00**	Electric Bulb, 110 volt	**.90**
		Electric Bulb, 220 volt	**1.00**

Attention is directed to the Bulletins describing Freas Vacuum Ovens and Freas Conditioning Ovens; also to the Bulletins describing Freas Thermostats and Water Baths, Freas Incubators, Thelco Ovens and Incubators. Any of these bulletins will be sent on application.



Freas Conditioning Oven No. 200 with Torsion Balance

Freas Conditioning Ovens

Specifications

Construction.—The Ovens proper are the standard Freas, Type R. The small tube electric lamp inside the oven acts as a pilot—it can be lighted at will—so that by means of the glass window in the door, parts of the chamber can be inspected without opening the door and cooling the chamber. Both sides of the oven are provided with windows of mica and glass, enabling the operator to see to make the shifts of the baskets, as described below. These windows are fitted with hinged shades, which should be kept closed when the drying operation is in progress. A standard slow speed motor, resting on a spring to take up vibrations, is supported on the outside of the Oven at the back. It is fitted with a belt tightener driving a centrifugal fan, which is so arranged above a flue in the back wall of the Oven as to provide forced circulation of heated air and a forced withdrawal of moisture-laden air. An endless link chain belt, running in grooved pulleys, is provided at certain distances with hooks, the points of which extend in the same direction as that of the chain. This chain, by means of a sprocket gear (not shown in the illustration), and a small hand wheel, which is shown on the side, may, from the outside, be made to travel at will, thereby moving any desired hook to the front of the Oven to place a basket upon it, or to remove the basket from the hook, or to bring any desired hook with its basket into position at either side of the Oven near the basket shifter. This basket shifter passes through the walls of the Oven, so as to be controlled by the operator from the outside; it will take up any basket properly placed by means of the chain control, and by a longitudinal movement of the shifter, the basket can be placed on the balance suspender ready for weighing.

Determining the Count of Cotton Yarns

A special Torsion balance, having a range from yarn No. 200 to 5, is used, unless an analytical balance is preferred. The scale is operated by placing 120 yards of yarn upon the pan provided. It is then brought to balance by means of the tare weights, and the result, read off directly, gives the exact count of cotton under test without any calculation whatever. The Oven No. 200, which is used with this balance, is provided with ten baskets.

For Moisture determinations when Bulky Samples are not used; also for General Chemical Purposes when it is desired to weigh in the chamber the dried sample

For these purposes, the Oven is available with baskets measuring 5½ inches high by 2¾ inches diameter, and 8 inches high by 4 inches diameter, respectively, as well as the Oven No. 200, which is fitted with ten baskets usually employed for determining yarn counts. A Torsion balance can be employed. However, an analytical balance is generally preferred if the Oven is not to be used exclusively for determining the yarn number.

For Moisture Determinations in Textile Materials, Paper, etc.

For this purpose Oven No. 220, with one basket measuring 17 inches long by 7 inches square, or Oven No. 230, with four baskets—whereby four determinations can be made at the same time—is employed. These baskets will accommodate from ½ to 1 lb. of sample, according to the nature of the material. The outfit, except for its size and the balance, is identical with the Conditioning Oven used for determining yarn counts.

For further particulars, write for bulletin on Freas Conditioning Ovens.

FREAS ELECTRIC CONDITIONING OVENS—Continued.

The following list embraces the outfits in most demand. Ovens of the sizes listed can be supplied with baskets of other sizes, and with balances of different form or capacity for specialized lines of work. Should a prospective purchaser be in doubt as to which outfit is suitable for his purpose, please submit particulars of the work to be undertaken, stating nature of the material to be tested, weight and volume of sample, and we will very gladly make suitable recommendation, if possible.

4823. **OVEN—Freas Electric Conditioning No. 200,** dimensions of chamber 12x12x12 inches, with ten baskets, each 2⅝ inches long by 1⅝ inches diameter, complete with connecting cord and plug to attach to electric light socket; without balance, for 110 volts **305.00**

4823/1. **OVEN—Freas Electric Conditioning No. 200,** with Torsion Glass Box Balance (No. 340) capacity 120 g. sensitive to 2 mg., including counterpoise for baskets with set of weights No. 504, 1 mg. to 50 g., for 110 volts **394.75**

4823/2. **OVEN—Freas Electric Conditioning No. 200,** with Torsion Balance for calculating woolen and worsted yarns, for 110 volts **407.50**

4823/3. **OVEN—Freas Electric Conditioning No. 200,** with Torsion Balance for calculating cotton yarns, for 110 volts **407.50**

4823/4. **OVEN—Freas Electric Conditioning No. 200,** with Analytical Balance (like No. 212) 100 g. capacity sensitive to 1/20 mg., including counterpoise for baskets, with set of analytical weights No. 470, 1 mg. to 50 g., for 110 volts **417.00**

4824. **OVEN—Freas Electric Conditioning No. 210,** dimensions of chamber 12x12x12 inches, with four baskets each 5½ inches long by 2¾ inches diameter without balance, for 110 volts **305.00**

4824/1. **OVEN—Freas Electric Conditioning No. 210,** with Analytical Balance (like No. 212) 100 g. capacity, sensitive to 1/20 mg., including counterpoise for baskets, with set of analytical weights No. 470, 1 mg. to 50 g., for 110 volts **417.00**

4824/2. **OVEN—Freas Electric Conditioning No. 210,** with balance (like No. 292) 250 g. capacity, sensitive to 1 mg., with agate knives; including counterpoise for baskets with set of weights No. 504, 1 mg. to 200 g., for 110 volts **370.00**

4825. **OVEN—Freas Electric Conditioning No. 215,** dimensions of chamber 12x12x12 inches, with two baskets each 8 inches long and 4 inches diameter complete with connecting cord and plug to attach to electric light socket; without balance, for 110 volts **300.00**

4827. **OVEN—Freas Electric Conditioning No. 215,** with balance (like No. 292) 250 g. capacity, sensitive to 1 mg. with agate knives, including counterpoise for baskets, with set of weights No. 504, 1 mg. to 200 g., for 110 volts **365.00**

4829. **OVEN—Freas Electric Conditioning No. 220,** dimensions of chamber 24x12x12 inches, with one basket 17 inches long by 7x7 inches with balance (like No. 292) 1000 g. capacity, sensitive to 5 mg. with agate knives, including counterpoise for baskets, with set of weights No. 504, 1 mg. to 500 g., for 110 volts **404.00**

4831. **OVEN—Freas Electric Conditioning No. 220,** with balance capacity 2500 g. sensitive to 10 mg. ..... **price on application**

4835. **OVEN—Freas Electric Conditioning No. 230,** dimensions of chamber 24x24x24 inches with four baskets each 17 inches long by 7x7 inches with balance (like No. 292) 1000 g. capacity sensitive to 5 mg. with agate knives, including counterpoise for baskets and set of weights No. 504, 1 mg. to 500 g., for 110 volts **price on application**

4835/1. **OVEN—Freas Electric Conditioning No. 230,** with balance capacity 2500 g. sensitive to 10 mg., for 110 volts ..... **price on application**

In ordering be sure to state whether your current is A. C. or D. C. If current is A. C. specify number of phases and cycles. Prices for outfits to use on 220 volt current furnished on application. Be sure to give full specifications.

4835/11

4836

EMERSON CONDITIONING OVENS

Electrically heated and provided with thermostats for regulating the temperature. Baskets for holding samples are mounted on a revolvable support, the baskets are brought into position under the weighing balances, and are weighed within the Oven. To expedite the drying, the circulation of heated air supplied to the Oven is artificially accelerated by means of a motor-driven fan. The weighing balance is sensitive to 10 milligrams.

4835/10. **OVEN—Emerson Electric Conditioning,** for determining moisture in cotton wool, silk, yarns, tops, coils, and other textile materials in process of manufacture, equipped with 1 large basket 7″ square by 18″ deep, with automatic temperature control **350.00**

4835/11. **Ditto**—but equipped with 4 baskets, 7″ square by 18″ deep, with automatic temperature control **475.00**

4835/12. **Ditto**—but equipped with 8 small baskets, 3″ square by 6″ deep, with automatic temperature control **375.00**

State Voltage when ordering.

VARSITY OR THELCO ELECTRIC OVENS

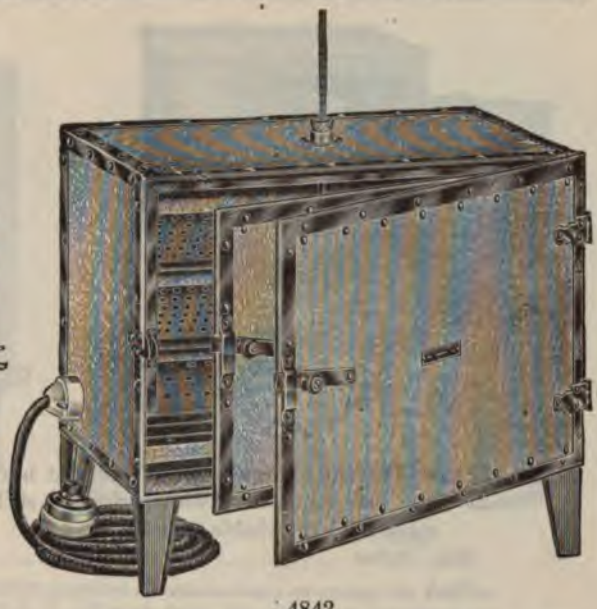
This well known, low priced Oven is built of asbestos transite with cast aluminum frame, door, and shelf racks. The base is of cast iron of substantial design. The Oven is finished inside and out with acid fume-proof mineral paint, presenting a neat and clean appearance.

The heating element is removable, and covers the bottom of the Oven, as shown in the illustration. It is made of asbestos transite, wound with a special resistance wire.

The Bimetallic Thermostat will maintain any desired temperature between that of the room and 150° C. This range of constant temperature adapts the Oven to a wide variety of work.

The contact points are placed on the outside. This eliminates danger of ignition when drying residues, which give off ether or other inflammable gas.

4841



4842

VARSITY OR THELCO ELECTRIC OVENS—Continued.

A switch is provided to turn the current "on" and "off," and a pilot lamp outside the Oven enables the operator quickly to adjust the regulator to any desired temperature. This adjustment is made without opening the door.

Adjustable ventilators are provided in the top and the door, also an opening in the top for the thermometer. Each Oven is supplied with two shelves, adjustable as to height, and with detachable cord and plug.

To place the Oven in use it is only necessary to attach the plug, turn on the current, and when the Oven reaches a temperature desired, adjust the regulator.

Varsity Ovens are used for a great variety of college work, and elsewhere where continuous operation is not required. They have been practically adopted as the standard apparatus for testing aircraft materials.

4836. **OVEN—Varsity or Thelco, small size,** inside dimensions 10x10x12" high. For cut, see preceding page **50.00**

4836/1. **Ditto**—But **large size,** inside dimensions 18x12x14" high **70.00**

4841. **OVEN—Electric, Students Compartment,** with temperature regulator. Similar to the Varsity Oven, large size, but provided with an arrangement made entirely of perforated aluminum divided to form eight compartments 4" x 5" x 6" deep. The sides of the compartments are supported two inches from all walls of the oven, providing circulation of the heated air. Complete with bimetallic regulator, removable heating plate, connecting cord and plug ready to connect to lighting socket; inside dimensions 18x12x14 inches high **120.00**

When ordering Varsity Ovens, be sure to state voltage of your current.

4842. **OVEN—Electric Drying, Chicago Surgical,** inside dimensions 10x10x14" wide. Single wall construction of insulating material. Two removable shelves. Temperature range 60° to 150° C. Heated electrically and automatically controlled by an Electro-Thermostat. Furnished with pilot lamp. Maximum current consumption, 6 amperes. Without thermometer **65.00**

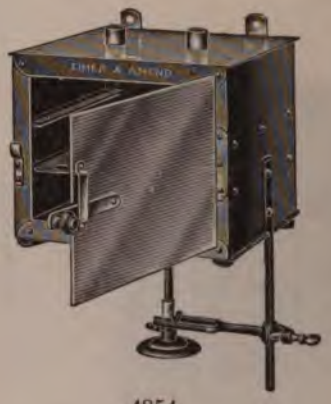
4842a. **Thermometer**—for above .....**extra** **2.50**

4842/1. **OVEN—Electric Drying, Chicago Surgical,** 10x10x18" wide. Double wall construction of insulating material, with an inner lining of Russia iron. Furnished with two removable shelves, heated electrically, and automatically controlled by an electro-thermostat. Temperature range 60–200° C. Furnished complete with six foot heat proof cord and snap switch. A pilot lamp indicates when current is on or off. Cut similar to No. 4842 ..... **125.00**

4842b. **Extra Heating Unit**—for No. 4842 and No. 4842/1 ..... **2.25**

4842c. **Thermometer**—for No. 4842/1 .....**extra** **2.50**

4852



4854

4852. **OVEN—Hot Air, single wall,** of polished heavy copper; openings on top for thermometer and ventilation; with perforated shelf, extra sheet iron bottom; mounted on substantial detachable iron legs.

Size, inches	6x8	8x10	10x12	12x16
Each	**9.00**	**13.00**	**16.00**	**32.00**

4854. **OVEN—Hot Air, single wall.** Arranged to fasten against the wall, as well as to stand upon a table. Of polished heavy copper, mounted on iron support; with Bunsen burner, fork, and rod for attaching the fork.

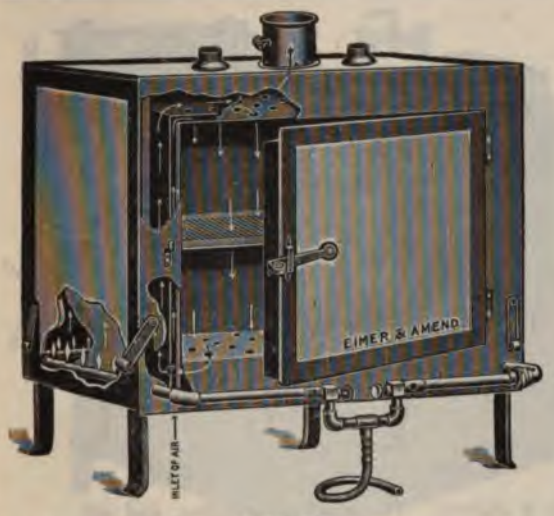
Size, inches	6x8	8x10
Each	**13.50**	**15.50**

4856

4858

4856. **OVEN—Hot Air, single wall,** of asbestos covered sheet iron; with four tubes converging from the center of the oven, evenly distributing the heat throughout the chamber. Size of chamber, 18 inches high, 12 inches deep, 12 inches wide **65.00**

4858. **OVEN—Hot Air, single wall,** of heavy copper. Size 12x10x10 inches. In this oven, quick evaporation is effected and uniform temperature maintained by means of a current of hot air entering the chamber from a series of connecting tubes, which are heated by the heat circulating between the two bottoms, the flame striking the upper bottom **32.50**



4860–62

4870

4868

4860. **OVEN—Hot Air, double wall.** Of asbestos covered Russian iron; openings on top for thermometer and thermostat. Heating is effected from the sides, as indicated by arrows, securing a uniform temperature. Size of chamber, 12 inches high, 18 inches wide, 9 inches deep **60.00**

4862. **Ditto**—size of chamber, 18 inches high, 24 inches wide, 14 inches deep **80.00**

For other sizes, see Bacteriological Catalog, Section II, Sterilizers.

4868. **OVEN—Hot Air, single wall,** of heavy copper; with adjustable coil burner and 3 wire gauze slides for maintaining a uniform temperature.

Size, inches	8x10	10x12
Each	**50.00**	**60.00**

4872

4870. **OVEN—Hot Air, single wall,** of heavy copper; with two openings in cover, and shelf. Size 7 inches high, 6 inches diameter **6.25**

4872. **OVEN—Hot Air, single wall, with 3 compartments,** of polished heavy copper; compartments 7 inches wide, 7 inches deep, each with a movable shelf and two openings at top. Mounted on permanent iron support; overall dimensions, exclusive of support, 21x8½x7 inches **35.00**

4873. **OVEN—Double wall, Bureau of Mines type,** designed especially for determining moisture in coal samples, as described in Bureau of Mines Technical Paper No. 8.

Consists of a double walled heavy copper cylinder of superior construction, closed at one end and having a double walled door at the other; the space between the outer and inner wall is for filling with a solution of glycerine in water (Sp. Gr. 1.19), the proportion being adjusted to maintain 105° C. in the chamber, which is provided with openings for thermometer and gas regulator, and fitted with a sliding shelf, having six holes 1½ inches diameter to accommodate crucibles. Mounted on rigid support as illustrated **100.00**

4873

4875 4876 4878 4882

4875. **OVEN—Double wall,** of heavy copper with 2 shelves. This oven is seamless, and can therefore be used as hot air, water, oil or paraffin bath. Size 8x8 inches 21.00

4876. **OVEN—Hot Water, double wall,** of heavy polished copper; openings on top for water, thermometer and thermostat; with perforated shelf, extra sheet iron bottom; mounted on substantial detachable iron legs.

Size, outside, inches	6x6x8	8x8x10	10x10x12
Size of chamber, inches	4¼x5x6	6x7x8	8x9x10
Each	**14.00**	**17.00**	**24.00**

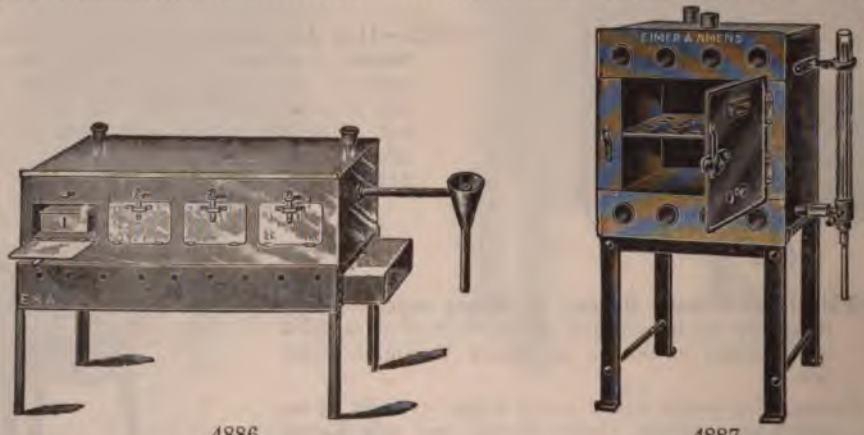
4878. **WATER REGULATOR—Kekulé,** for above ..... **extra** 2.0

4880. **OVEN—Hot Water, steam heated,** same as No. 4876, of extra heavy polished copper; coil for heating by live steam, with inlet and outlet threaded for connection.

Size, outside, inches	8x8x10	10x10x12	12x12x16
Each	**22.50**	**34.00**	**53.00**

4882. **OVEN—Hot Water, combined oven and water bath.** The same as No. 4876, but with opening on top, fitted with set of concentric copper rings, and Kekulé water regulator.

Size, outside, inches	6x6x8	8x8x10	10x10x12
Size of chamber, inches	4¼x5x6	6x7x8	8x9x10
Each	**17.00**	**25.00**	**31.00**



4886 4887

4886. **OVEN—Hot Water, Blair,** as used in the analysis of iron ores. Made of heavy copper, with constant water level, mounted on sheet base with legs; 4 compartments, 4⅞x6x2½ inches high, each provided with copper box numbered; size, 4x4¾x1½ inches high. Overall dimensions, exclusive of support, 24x7x7 inches 52.50

4887. **OVEN—Hot Water, double wall, Ultsch,** for constant temperature; of heavy copper, with light hard soldered copper tubes inserted into the water compartment; to accommodate boats, tubes and other small drying receptacles. Size of chamber 7x7x6 inches high; tubes 8½ inches long, 1⅛ inch diameter; with water regulator 42.00

4893

4894

4893. **OVEN—Vacuum, double wall, for gas heating;** as used by the Bureau of Chemistry of the U. S. Dept. of Agriculture, Sugar, Grain and other laboratories. Inside dimensions 16 inches long, 8 inches diameter. Complete with vacuum gauge **350.00**

The shell is made of seamless drawn heavy brass tubing, jacketed with 1-inch space. The door has a ground joint flanged face, insuring a perfect air-tight joint. The walls are secured with stay rods clamping the heads and seating the ground joints, so as to make a perfect fit without the use of gaskets or solder. The oven is provided with 2 copper perforated trays above and below; two ¼″ perforated brass pipes, which may be used to moisten the material within the oven; two perforated pipe burners for gas heating; a constant level arrangement for the water in the jacket; and also openings for exhaust air and moisture from the chamber, for thermometer and gauge. The oven is supported by an angle iron frame, incased in sheet iron.

4894. **OVEN—Vacuum, single wall, Carr** (see Wiley's Agricultural Products, Vol. III, p. 23). Made of heavy brass casting, with heavy brass door fitting tightly with lead or rubber gasket, securely held by six thumb screws. Inside dimensions of chamber, 12 inches long, 8 inches diameter; with copper shelf, vacuum gauge, and openings for thermometer and thermostat **150.00**

4897

4897. **OVEN—Double wall, for drying in a current of hydrogen, etc.** Substantially made of heavy copper and provided with one shelf. Outside dimensions 18 inches long by 10 inches diameter; inside dimensions 17 inches long by 6¾ inches diameter. Not intended for heating by steam pressure. Will withstand partial vacuum, not exceeding about ten inches.... **92.50**

Freas Electric Oven, Type V

(Vacuum)

The Freas Electric Vacuum Oven was designed to meet the demand for a really satisfactory vacuum oven. This demand has been created by the rapidly growing recognition of the advantages of drying in vacuo, thus permitting most drying operations to be conducted more satisfactorily than in an air oven and in many instances in a fraction of the time.

Moisture tests of flour can be made in a Freas Vacuum Oven at 75° C. in from four to five hours, while in an ordinary Oven 100° C., and from ten to twelve hours are required. Moreover, when making the test at 100° C., there is great danger of charring, and therefore of spoiling the test.

These same conditions apply for organic tests in general; whether for fertilizer, where tests must be made at the lowest possible temperature to avoid driving off nitrogen compounds, or for powder, where the same conditions apply, along with the danger of igniting the sample; or for milk, where there is great danger of charring; or for operations involving essential oils; in fact, for practically every organic moisture test, the Vacuum Oven is a great convenience, and in many cases it is an absolute necessity.

These various drying operations can be carried on in the Freas Vacuum Oven at any desired temperature up to 180° C. with practically no attention on the part of the operator. It is thoroughly reliable for long, continuous, unattended operations.

Some work can be carried on to advantage in an atmosphere of hydrogen, nitrogen, carbon dioxide, or other gas. In such cases it is only necessary to pass a current of the desired gases through the vacuum chamber. However, where there is any gas pressure, certain special attachments are required.

A feature of the Freas Vacuum Oven is that the vacuum chamber can be easily removed, allowing the Oven proper to be used as a regular Drying Oven when vacuum drying is not needed.

Each Oven is supplied with a high grade thermometer of special design and long stem, on which the graduations are etched to 200° C.

SOME OF THE USERS OF FREAS VACUUM OVENS—SMALL SIZE

Columbia University ..... New York, N. Y.
Western Reserve University ..... Cleveland, O.
Tennessee Copper Company... Ridgefield Park, N. J.
University of Illinois ..... Urbana, Ill.
Bureau of Standards ..... Washington, D. C.
Bureau of Plant Industry ..... Washington, D. C.
Bureau of Soils ..... Washington, D. C.
Pompeian Company ..... Baltimore, Md.
Rockefeller Institute ..... New York, N. Y.
J. T. Donald Company ..... Montreal, Can.
Firestone Tire & Rubber Co. ..... Akron, O.
Spreckels Sugar Company ..... San Francisco, Cal.
University of Kansas ..... Lawrence, Kan.
N. Y. State Agri. Exper. Station ..... Geneva, N. Y.
The Raffald Co. of America ..... Lawrence, Mass.
Western Electric Company ..... Chicago, Ill.
Exper. Station of Hawaiian Sugar Planters' Association ..... Honolulu, T. H.
Chemical Syndicate of Montreal .... Montreal, Can.
Conn. Agri. Experiment Station... New Haven, Conn.
Internal Revenue ..... Ottawa, Can.
Imperial Ministry of Munitions ..... Ottawa, Can.
New Mexico College of Agri..... Mesilla Park, N. M.
Nixon Nitration Company .... New Brunswick, N. J.
Ismert-Hincke Milling Company... Kansas City, Mo.
Wm. Wrigley, Jr., Co. ..... Long Island City, N. Y.

SOME OF THE USERS OF FREAS VACUUM OVENS—LARGE SIZE

Bethlehem Steel Co. ..... South Bethlehem, Pa.
Hercules Powder Company ..... Kenvil, N. J.
Fleischmann Company ..... Peekskill, N. Y.
Experiment Farm ..... Ottawa, Can.
Iowa State Experiment Station ..... Ames, Ia.
Oklahoma Agri. Exper. Station ..... Stillwater, Okla.
Indiana State Chemist, Purdue Univ.. Lafayette, Ind.
Union Powder Corporation .... Edgar Landing, N. J.
Georgia State Chemist ..... Atlanta, Ga.
Empire Metal Products Corp. ..... Irvington, N. Y.
O'Brien Munitions, Ltd. ..... Renfrew, Ont., Can.
University of Chicago ..... Chicago, Ill.
Canada Ingot Iron Company ..... Winnipeg, Can.
University of Toledo ..... Toledo, O.
Illinois Food Laboratory ..... Chicago, Ill.
E. I. du Pont Company ..... Wilmington, Del.
Walco Manufacturing Corp. ..... Providence, R. I.
Ohio Agricultural Exper. Station ..... Wooster, O.
B. Arkell, Bush Terminal ..... Brooklyn, N. Y.
Edward P. Dolbey Company ..... Philadelphia, Pa.
Takamine Laboratory ..... New York, N. Y.
University of Idaho ..... Moscow, Idaho
University of Saskatchewan ..... Saskatoon, Can.
Great Western Sugar Co. ..... Denver, Colo.
Wm. Wrigley, Jr., Company ..... Chicago, Ill.
Cudahy Packing Company ..... So. Omaha, Nebr.
Cudahy Packing Company ..... East Chicago, Ind.
Case Research Laboratory ..... Cleveland, O.

4903

4903. OVEN—Freas Electric, Vacuum, Type RV

The Freas Type RV Oven consists of a constant temperature Electric Oven, inside dimensions 12″ x 12″ x 12″, constructed, heated, and regulated upon the same principles as the regular Freas Oven No. 100, so widely and favorably known.

The vacuum chamber, inside dimensions 9″ x 9″, made of heavy cast bronze, is firmly supported in the chamber of the oven proper, and provided with racks for shelves; also four perforated metal shelves, connections for vacuum and for passing through the chamber a stream of warm air, hydrogen or other reducing gases. The front, on which rests the door, is heavily re-enforced, as is the door, to give a substantial bearing surface. This produces a perfect vacuum-tight connection. The ground surfaces of the vacuum chamber and its door are held together by sturdy spring clips until the vacuum pump is started. Then the reduced pressure holds the door in a very firm and air-tight condition. This construction allows instant removal of the door and permits the bearing surfaces to be easily and accurately reground in case of need, by simply revolving the door, with assistance of the two handles provided thereon. The central part of the door and the back of the chamber are constructed of a cast grid, on which rests a mica plate, made vacuum-tight with its frame—this allows inspection of the vacuum chamber by means of the electric lamp at the back of the oven beyond the vacuum chamber. The oven proper is provided with two perforated aluminum shelves and is equipped with cast aluminum racks, allowing the shelves to be placed at any height desired when the vacuum chamber is removed. With thermometer **265.00**

4903a. Vacuum Chamber—only **140.00**

4903b. Thermometer—only **3.50**

When ordering, specify voltage.

4905

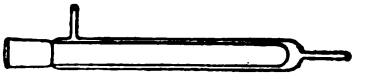
4905. OVEN—Freas Electric, Vacuum, Type LV

The Freas Type LV Oven consists of a rectangular constant temperature Electric Oven, inside dimensions 12" x 12" x 28" long, outside 16" x 23" x 32", heated and regulated on the same principle as the regular Freas Oven. The Oven chamber is fitted with cast bronze vacuum chamber, inside dimensions 8" x 8" x 18" long, properly supported, and provided with connections for vacuum and for passing in a stream of hydrogen or other gas. The body of the chamber is square, with rounded corners. The front, on which fits the door, is cast circular, heavily reinforced, as is the door, to give a substantial bearing surface, which produces a perfect vacuum-tight connection. The door can be rotated in a swivel holder, which swings on the hinges; this permits of these bearing surfaces being easily and accurately ground in case of need. The central part of the door and the back of the chamber, like the RV Oven, are constructed of a cast grid, on which rests a mica plate made vacuum-tight with its frame—this permits inspection of the chamber by means of the electric lamp at the back of the Oven beyond the vacuum chamber. The vacuum chamber is provided with cast ribs on the sides to accommodate up to ten shelves—six shelves are furnished. This Oven is the one regularly used in large fertilizer, food, powder, and similar laboratories. Its substantial construction, comparatively large size, and satisfactory operation, make it the standard Vacuum Oven **375.00**

4905a. Vacuum Chamber—only **205.00**

Thermometer—for above, see No. 4903b.

When ordering, specify voltage.



4914

4918

4922

4924

4914. **OZONE TUBE—Siemens,** of glass, unmounted; small size **2.00**

4916. **Ditto**—large size **2.50**

4918. **OZONE TUBE—No. 4914,** mounted on board with terminals, as illustrated **6.60**

4920. **OZONE TUBE—No. 4916,** mounted on board with terminals **7.50**

4922. **PAIL—Agateware,** with cover for laboratory waste.

Capacity, gallons	2	5
Each	**2.00**	**3.75**

PALLADIUM TUBE—see No. 3620.

4924. **PAN—Gold Washing,** 16 inches diameter.

	Plain Iron	Polished Iron	Agateware	Aluminum
Each	**.75**	**1.00**	**1.60**	**2.65**

4926. **PAN—Gold Washing,** shallow; so called "Batea," 10 inches diameter **2.25**

PAN—Sampling, see Sampling Apparatus.

Paper

4928. **PAPER—Adams,** fat extracted, for milk analysis. In strips 58x6.5 cm...**package of 50** **2.60**
package of 100 **5.20**

4930. **PAPER—Drop Reaction,** for quickly absorbing a drop of liquid, without spreading; more accurate drop tests can be made using this paper than by a porcelain plate. In sheets 22x14 cm. .....**per quire** **1.30**
per package of 100 sheets **4.25**

4932. **PAPER—Emery,** coarse, medium or fine .....**per doz. sheets** **.90**

4934. **PAPER—Glazed,** white, black or colored; in sheets 20x24 inches .....**per quire** **1.00**

4936. **PAPER—Parchment,** for dialysing, and capping bottles .....**per lb.** **.75**

4942. **PAPER—Sand,** fine, medium or coarse; in sheets .....**per quire** **1.00**

4944. **PAPER—Test, Litmus,** red, blue or neutral; in sheets 10x19 inches .....**per sheet** **.15**
per quire **1.00**

4944/1. **PAPER—Test, Turmeric,** in sheets 10x19 inches .....**per sheet** **.15**

4952. **PAPER—Test, Litmus,** red, blue, or neutral, in vials containing 100 strips .....**doz.** **1.00**

4952/1. **Ditto—Squibb** .....**doz.** **2.40**

4954. **LITMUS PENCIL**—red and blue combined ..... **.35**
For other Test Papers, see Chemical Catalog.

4956. **PAPER BAGS**—Of heavy rope paper, with metal band closing device which cannot become undone whilst in transit; for ore samples, etc.

Size, inches when folded twice	5¼x3¼	6x4	7x4½	8x5	12x7
Per 100	**1.45**	**1.70**	**1.85**	**2.10**	**3.60**

4960 **PAPER—Filtering, Chinese Rice Paper,** very substantial and quick filtering; in sheets 18x28 inches .....**per quire** **.65**
per ream **10.00**

4962. **PAPER—Filtering, Japanese,** for photographers, etc., to filter emulsions, collodion, etc., in sheets 11x15 inches .....**per quire** **.30**
per ream **5.00**

4964. **PAPER—Filtering, Bibulous,** common white; in sheets 15x18 inches .....**per quire** **.40**
per ream **6.00**

4970

"E. & A." Filter Paper

Proclaimed by numerous industrial and laboratory users the **best** of all domestic and imported filter papers for all round qualitative work. **Ideal** for filtering a wide range of solutions, from **weak** caustic to strong nitric acid. These are strong, dependable, high grade filter papers made from **pure** cotton fibre and supplied at moderate prices.

4970. **PAPER—Filtering, "E. & A." White,** embossed for quick filtering. In packages containing 100 circles.

Diam., cm.	7.5	9	10	11	12.5	15	19
Per package	**.17**	**.19**	**.21**	**.23**	**.25**	**.34**	**.57**
Per 10 packages	**1.50**	**1.65**	**1.85**	**2.00**	**2.20**	**3.00**	**5.00**
Diam., cm.	20	25	33	40	45	50	
Per package	**.65**	**.75**	**1.20**	**1.70**	**2.05**	**2.60**	
Per 10 packages	**5.50**	**6.60**	**10.70**	**14.80**	**18.10**	**22.50**	

4972. **PAPER—Filtering, "E. & A." White,** in sheets 20x20 inches, embossed or smooth. The embossed filters more quickly, and is always given unless smooth is specified .....**per quire** **.65**
per ream **10.00**

4974. **PAPER—Filtering, "E. & A." Gray,** especially recommended for filtering sugar solutions. In packages containing 100 circles.

Diam., cm	15	19	25	33	40	45	50
Per package	**.30**	**.46**	**.67**	**1.00**	**1.50**	**1.90**	**2.40**
Per 10 packages	**2.70**	**4.00**	**6.00**	**9.00**	**13.00**	**16.50**	**21.00**

4976. **Ditto—in sheets,** 20x20 inches ....**per quire** **.60**
per ream **9.00**

4978. **PAPER—Filtering, "E. & A." Gray, Extra Heavy,** used especially for filtering oils and in connection with filter presses; in sheets 22x23 inches .....**per quire** **3.00**
per ream **48.00**

4982. **PAPER—Filtering, French, White,** Prat Dumas make; in packages of 100 circles.

Diameter, cm.	7	10	13	15	19	25	33	40	45	50
Per package ..	**.28**	**.45**	**.56**	**.67**	**.78**	**1.00**	**1.55**	**1.90**	**2.35**	**3.20**

4984. **Ditto—in sheets,** 17x22 inches .....per quire **.70**
per ream **11.70**

4986. **PAPER—Filtering, French, Gray,** Prat Dumas make; in packages of 100 circles.

Diameter, cm.	15	19	25	33	40	45	50
Per package	**.56**	**.67**	**.88**	**1.34**	**1.66**	**1.90**	**2.80**

4988. **Ditto—in sheets,** 17x22 inches .....per quire **.60**
per ream **9.40**

4990. **PAPER—Filtering, Chardin, for Agar Agar,** folded. Diameter 32 cm., in boxes of 50 filters **3.00**

4992. **Ditto**—diameter 50 cm., in boxes of 25 filters **1.50**

4994. **Ditto—in square sheets,** 20x20", Whatman OT .....per quire **.60**
per ream **9.00**

Whatman Filter Papers

All grades are guaranteed free from Starch and Chlorine. All Whatman Circles are packed in sealed boxes, distinctively labeled. For orders less than $100.00, list prices of Whatman Paper are net. For orders amounting to $100.00 or over, there is a discount of 5% from list, and for orders amounting to $200.00 or over there is a discount of 10%.

4997. **PAPER—Filtering, Whatman No. 1.** A high-grade rapid chemical filter paper for general qualitative work, where the ash weight of the paper is of no consequence. Widely used in the determination of phosphorus for the filtration of the yellow ammonium phosphomolybdate precipitate; also for general work in sugar laboratories.

Dia. in cm.....	4.25	5.5	7	9	11	12.5	15	18.5	24	27	32	38.5	40	50
Ash, per circle in gms.....	.00017	.00028	.00046	.00076	.0011	.0016	.0021	.0032	.0054	.0068	.0096	.0138	.0150	.0233
Per pkg.	**.16**	**.17**	**.20**	**.24**	**.28**	**.37**	**.51**	**.71**	**1.25**	**1.48**	**2.30**	**2.76**	**3.13**	**4.40**

4997/1. **Ditto**—in sheets 18¼x22½ inches .....per ream **20.25**
per 100 sheets **4.45**

5001. **PAPER—Filtering, Whatman No. 2.** This paper is similar in general characteristics to No. 1, but stouter, being about 50 per cent. heavier. It is the standard grade for analytical work. Widely used where fine crystalline precipitates are encountered; as, for example, in fertilizer, cement, steel, and ore laboratories.

Diam. in cm.	4.25	5.5	7	9	11	12.5	15	18.5	24	27	32	38.5	40	50
Ash, per circle in gms.	.00028	.0004	.0007	.0012	.0018	.0024	.0034	.0052	.0089	.0113	.0158	.0229	.0247	.0387
Per pkg.	**.20**	**.21**	**.27**	**.34**	**.42**	**.52**	**.74**	**1.04**	**1.78**	**2.16**	**3.30**	**4.00**	**4.55**	**6.00**

5001/1. **Ditto**—in sheets 18¼x22½ inches ..... **per ream 31.10**
per 100 sheets 6.85

5001/2. **Ditto**—in sheets 23x23 inches ..... **per ream 40.00**
per 100 sheets 8.80

5003. **PAPER—Filtering, Whatman No. 3.** A very stout, strong paper, slightly slower than No. 2, but very retentive. It is especially suited for filtering the solution of a fusion made with Eschka's mixture, in determining sulfur in coal and coke.

Diam. in cm.	5.5	7	9	11	12.5	15	18.5	24	27	32	38.5	40	50
Per pkg.	**.34**	**.40**	**.50**	**.57**	**.74**	**1.04**	**1.48**	**2.53**	**3.10**	**4.70**	**5.70**	**6.50**	**8.60**

5003/1. **Ditto**—in sheets 18¼x22½ inches ..... **per ream 46.40**
per 100 sheets 10.20

5005. **PAPER—Filtering, Whatman No. 4.** This paper is very soft, of open texture, and particularly recommended for gelatinous and large-particle precipitates. Widely used for pharmaceutical purposes, filtering fruit juices, syrups, oils, etc.

Diam. in cm.	5.5	7	9	11	12.5	15	18.5	24	27	32	38.5	40	50
Per pkg.	**.27**	**.30**	**.40**	**.50**	**.65**	**.90**	**1.30**	**2.22**	**2.70**	**4.10**	**4.95**	**5.70**	**7.50**

5005/1. **Ditto**—in sheets 18¼x22½ inches ..... **per ream 39.90**
per 100 sheets 8.75

5009. **PAPER—Filtering, Whatman No. 5.** A very tough, hard paper, extremely retentive. Retains barium sulfate and lead sulfate, even when freshly precipitated. Suitable for vacuum filtrations with Buchner funnels.

Diam. in cm.	5.5	7	9	11	12.5	15	18.5	24	27	32	38.5	40	50
Per pkg.	**.20**	**.27**	**.34**	**.41**	**.54**	**.75**	**1.11**	**1.78**	**2.17**	**3.35**	**4.00**	**4.60**	**6.00**

5009/1. **Ditto**—in sheets 18¼x22½ inches ..... **per ream 31.50**
per 100 sheets 6.95

5011. **PAPER—Filtering, Whatman No. 10.** A strong, rapid filtering paper, unexcelled for general Qualitative work with fine precipitates. It will be noted that the ash content of No. 10 is between that of WHATMAN No. 2 (*unwashed*) and No. 30 (*single acid washed*).

Diameter, cm.	5.5	7	9	11	12.5	15	18.5
Ash, per circle, grams	.00018	.00029	.00048	.00072	.00092	.00132	.00203
Per package	**.35**	**.40**	**.55**	**.70**	**.80**	**1.15**	**1.60**

5013. **PAPER—Filtering, Whatman Black No. 29.** Useful for the filtration of light colored sediments, the most minute traces of which are easily perceptible.

Diameter, cm.	5.5	7	9	11	12.5	15	18.5
Per package	**.34**	**.40**	**.50**	**.60**	**.75**	**1.04**	**1.47**

5017. **PAPER—Filtering, Whatman No. 30, Single Acid Washed.** This paper, having low ash and close texture, is suitable for general quantitative work.

Diameter in cm.	5.5	7	9	11	12.5	15	18.5
Ash, per circle in grams	.000077	.00012	.0002	.0003	.0004	.00057	.00087
Per package	**.54**	**.68**	**.90**	**1.20**	**1.50**	**1.90**	**2.70**

5017/1. **Ditto**—in sheets 18¼x22½ inches ..... **per ream 97.80**
per 100 sheets 21.55

5017A. **PAPER—Filtering, Whatman No. 31, Single Acid Washed.** A paper similar in general characteristics to No. 30, but more rapid. Not recommended for use with the finest precipitates, but for the rapid filtration of gelatinous and large-particle precipitates it is eminently satisfactory. Same size circles, ash weights, and prices as No. 30 but not supplied in large sheets.

5019. **PAPER—Filtering, Whatman No. 40: Ashless.** This paper, double-acid washed, thus removing all traces of silicious matter, is the standard "Ashless" paper for analytical purposes. Filters rapidly and retains fine precipitates.

Diam. in cm.	5.5	7	9	11	12.5	15	18.5
Ash, per circle in grams	.00003	.00005	.000082	.00012	.00016	.00023	.00035
Per package	**1.10**	**1.20**	**1.70**	**2.00**	**2.30**	**2.70**	**3.60**

5021. **PAPER—Filtering, Whatman No. 41: Ashless.** A double-acid washed paper possessing the same excellent qualities as No. 40, but more open in texture, therefore filtering more rapidly. Especially suitable for iron, aluminum, and other gelatinous precipitates which can be filtered quickly and washed rapidly and easily. Sizes, ash weights, and prices, same as No. 40.

5023. **PAPER—Filtering, Whatman No. 42: Ashless.** This paper, also rendered ashless by the dual acid treatment, differs from No. 40 and No. 41 by being much harder and extremely close in texture. Recommended for use preferably with vacuum. Suitable for filtration of barium sulfate, and such precipitates when circumstances do not allow them to be precipitated in hot solution; also metastannic acid. Sizes, ash weights, and prices, same as No. 40.

5025. **PAPER—Filtering, Whatman No. 43: Ashless and fat-free.** A double-acid washed paper, resembling No. 40, but subjected to an additional chemical process that renders it *fat-free*. Its application is not at all limited to use in the Roese-Gottlieb fat test, but it is suitable for any other purpose where a fat-free paper is needed.

Diam. in cm.	5.5	7	9	11	12.5	15
Per package	**1.35**	**1.50**	**2.20**	**2.55**	**2.80**	**3.60**

5027. **PAPER—Filtering, Whatman No. 44: Ashless.** This paper is of the same quality paper as No. 40, but, being thinner, has an even lower ash-content. It is slower in filtration than No. 40, but is *recommended for use when the greatest possible degree of accuracy in quantitative work is required.*

Diam. in cm.	5.5	7	9	11	12.5	15
Ash, per circle in grams	.00002	.00003	.00005	.000077	.0001	.00014
Per package	**1.35**	**1.50**	**2.20**	**2.55**	**2.80**	**3.60**

5029. **PAPER—Filtering, Whatman No. 50.** A very tough paper specially **hardened** to resist great pressure and retain the finest precipitates. It is supreme for filtering biological products. The hard, smooth surface allows precipitates to be scraped off without injury to the paper itself, and without contaminating the filtered product by paper particles. With this paper very fine precipitates (almost colloidal) may be filtered under vacuum with great success.

Dia. in cm.	4.25	5.5	7	9	11	12.5	15	18.5	24	27	32	38.5	40	50
Per package	**.55**	**.90**	**1.20**	**1.70**	**2.00**	**2.30**	**2.70**	**3.60**	**6.10**	**7.30**	**11.35**	**13.75**	**15.75**	**20.85**

5033. **PAPER—Filtering, Whatman Folded No. 12.** A high grade rapid filtering paper; free from chlorine; of strength and correct folding to prevent tearing of the point. Packed in stout cardboard-hinged boxes containing 100 papers. For cut, see next page.

Diam. in cm.	12½	15	18½	24	32	38½	50
Per package	**.80**	**1.00**	**1.20**	**1.80**	**2.80**	**3.50**	**5.50**

5037. **PAPER—Filtering, Whatman Folded with Parchmentized Points No. 14.** These papers are similar to No. 12, but have parchmentized points, to prevent tearing even under considerable pressure.

Diam., cm.	32	38.5	50
Per package	**3.20**	**4.00**	**6.40**

5033

5051

5041. **FILTER CONES**—Semi-circular discs of hardened paper WHATMAN No. 50, of special shape. Suitable for use with vacuum as a substitute for platinum cones, enabling a perfect fit to be obtained in the funnel.

Diameter, cm.	5½	7	9	11	12½	15	18½	24
Per box of 100	.70	.90	1.40	1.60	1.80	2.10	2.80	4.80

5051. **WHATMAN DIFFUSION SHELLS**—Far superior to Parchment Paper, for use with small volume of fluid, as they offer the largest possible dialyzing surface requiring only a small outside vessel.

Size	90 x 16 mm.	100 x 35 mm.
Per box of 25 shells	6.00	14.00

5057. **ABSORPTION BLOCKS**—Made from paper purified by acids. Used to absorb difficultly combustible liquids for calorimetric determinations, etc.
Size 14 x 25 mm. Per box of 50 ..... 1.60

C. S. & S. Filter Papers

At the time of going to press our pre-war stock of C. S. & S. paper was practically exhausted, and as no new shipments had reached us, we were not in a position to give itemized prices for the different grades and sizes. However, in response to daily requests we have ordered a complete line of this filter paper and expect to be in a position to fill requirements from stock by the time the catalog is issued. For particulars as to grades and sizes, see our 1913 Catalog C.

Munktell Swedish Filter Paper

5058. **PAPER—Filtering, Swedish, No. 00, washed with hydrofluoric and hydrochloric acid.** Circular, 100 filters in a package, 5 packages in a box.

Diameter, cm.	5½	7	9	11	12½	15	18½
Per package	1.50	1.65	2.40	3.00	3.30	3.75	6.30
Per box (5 packages in a box)	7.50	8.25	12.00	15.00	16.50	18.75	31.50

5059. **PAPER—Filtering Swedish, No. 0A,** similar to No. 5058, but quicker filtering. Prices and sizes same as No. 5058.

5060. **PAPER—Filtering, Swedish, No. 0, washed with hydrochloric acid.** Circular, 100 filters in a package, 5 packages in a box.

Diameter, cm.	5½	7	9	11	12½	15	18½
Per package	.60	.81	1.26	1.65	1.89	2.55	3.75
Per box (5 packages in a box)	3.00	4.05	6.30	8.25	9.45	12.75	18.75

5062. **Ditto—in sheets, 48x48 cm.** ..... per quire 7.50
per ream 135.00

5064. **PAPER—Filtering, Swedish, No. 0B, washed in hydrochloric acid.** The same quality as No. 0 but heavier, filtering more rapidly, and retaining the finest precipitates. Circular filters, 100 to a package, 5 packages in a box.

Diameter, cm.	5½	7	9	11	12½	15	18½
Per package	.69	.90	1.44	1.89	2.10	2.85	4.20
Per box (5 packages in a box)	3.45	4.50	7.20	9.45	10.50	14.25	21.00

5066. **PAPER—Filtering, Swedish, No. 1F,** less ash than any other unwashed paper. Circular filters, 100 filters in a package, 5 packages in a box.

Diameter, cm.	5½	7	9	11	12½	15	18½
Per package	.33	.48	.75	.90	1.20	1.50	2.25
Per box (5 packages in a box)	1.65	2.40	3.75	4.50	6.00	7.50	11.25

5068. **Ditto—in sheets,** 48x48 cm. ..... per quire 3.60
per ream 60.00

5070. **PAPER—Filtering, Swedish, No. 2,** of medium thickness, more rapid in filtration than No. 1F. Circular filters, 100 filters in a package, 5 packages in a box.

Diameter, cm.	5½	7	9	11	12½	15	18½
Per package	.30	.39	.60	.78	.93	1.20	1.59
Per box (5 packages in a box)	1.50	1.95	3.00	3.90	4.65	6.00	7.95

5072. **Ditto—in sheets,** 48x48 cm. ..... per quire 3.00
per ream 51.00

5074. **PAPER—Filtering, Baker & Adamson, washed in hydrochloric and hydrofluoric acid;** thin quality "A"; circular.

Diameter, cm.	5½	7	9	11	12½	15
Per 100	1.20	1.40	1.70	2.15	3.40	4.20

Apparatus for Testing Paper, Yarn, Etc.

BALANCES—see **Balances.**

5081. **PAPER TESTER—Motor Driven Universal Tester.** This machine was developed for the U. S. Navy Department and was designed to cover a large variety of work. It is intended for testing the strength of paper, rubber, single or plied yarns, in 36 or 54 inch leas, thread twine, cord, catgut, copper wire, cloth, webbing, braids, tapes, laces, leather, insulations, etc. The dial is arranged with two rows of graduations, the inner reading from 0–75 lbs. by ¼ lb., the outer from 0–300 lbs. by lbs. By means of a single thumb screw the lower weight is quickly removed, thus changing from the heavier to the lighter setting. A set of flat grip fabric clamps is provided, also interchangeable eccentric rubber clamps and yarn spools. Small cleats are provided for single strands. The stretching screw has a maximum movement of 24 inches. A stretch device consisting of an adjustable tape registers the elongation of the sample. The motor is ⅛ H. P. with a control switch and can be connected to any lighting circuit. For cut, see next page 660.00

Net weight 395 lbs. Gross weight 520 lbs. Case dimensions, inches, 20 x 19 x 96.

Advise voltage of current. If A. C., state number of phases and cycles.

5081a. **Automatic Charting Device**—for stretch and strength 150.00

5081

5092

5092. **PAPER TESTER—Mullen.** This machine accurately and automatically registers the strength of paper in pounds to the square inch, by the scientific application of hydraulic pressure.

The paper is clamped over one end of a cylinder which is filled with liquid. The liquid in this cylinder is compressed by means of turning a hand-wheel, and is thus forced up against the paper. There is a rubber diaphragm between to keep the fluid from wetting the paper. At the same time that the fluid is being pressed up against the paper, the same fluid is acting directly on a standard pressure gauge, so that the pressure is registered in pounds per square inch. This fluid pressure is increased until the paper is burst. At the breaking point, the gauge pointer remains stationary, so that the results can be read closely. Then by pressing a button on the side of the gauge, the pointer is returned to zero, and further tests can be made 135.00

5094. **"AUTOMATIC" THICKNESS GAUGE**—This ingenious apparatus registers automatically with mathematical precision the thickness of every description of rubber, caoutchouc, web fabrics, felt, paper, cardboard, etc. The machines are arranged for measuring sheets of rubber, felt, web fabrics or paper, cardboard, millboard, etc. Dial 0–2 mm., divisions in 1/100 mm., diameter of dial 135 mm. For cut, see next page ..... **price on application**

5095. **POCKET THICKNESS GAUGE**—This is a strictly high grade instrument with all the precision and accuracy of the larger gauges but so compact in size that it can be carried in the vest pocket complete with the case. It naturally fits the hand as you operate it. The dial is 1⅜ inch diameter graduated in thousandths of an inch, and half thousandths can be accurately estimated. The jaws open to more than three hundred thousandths of an inch, the pointer going three times around the dial. This little gauge is found very useful in all lines of the paper trade 27.50

5097. **PRESSURE BULKER**—This instrument fills a very definite need by providing a positive uniform standard for measuring the bulk of paper. A pile of sheets, printer's dummy or the like, is placed between the contact faces, and the handwheel clamp is screwed down until the desired pressure is indicated on the dial. The thickness can then be read directly from the vertical scale. The pressure is indicated in pounds per square inch and the thickness in inches and fractions of an inch 102.50

5112

5114

5116

5117

PARAFFIN BATHS AND OVENS—See **Bacteriological Catalog,** Section II.

5110. **PENCIL—Wax,** for writing on glass; blue, red or yellow ..... each **.18**
dozen **1.80**

PENCIL—Litmus, see No. 4954.

5112. **PERCOLATOR—Mohr,** conical shape, heavy glass, with ground top.

Capacity, pints	½	1	2	gallons	½	1	2	3	5
Each	**.55**	**.70**	**.80**		**1.05**	**1.45**	**2.90**	**5.25**	**11.00**

5114. **PERCOLATOR—Oldberg,** narrow, heavy glass.

Capacity, pints	½	1	2	gallons	½	1	2	3
Each	**.55**	**.70**	**.95**		**1.35**	**2.25**	**4.40**	**6.00**

5116. **PERCOLATOR—Tin Plate,** with cover sieve and stopcock.

Capacity, pints	1	2	gallons	½	1	2
Each	**5.00**	**5.50**		**6.50**	**7.75**	**9.50**

5117. **PERCOLATOR—Iron, Porcelain Lined.** Complete with porcelain lined cover and stopcock. (Rings furnished with all Percolators.)

Capacity, quarts	2	4	6	8	12	16	20	30	40
Each	**9.50**	**12.75**	**16.00**	**17.50**	**19.00**	**21.00**	**22.00**	**26.00**	**30.00**

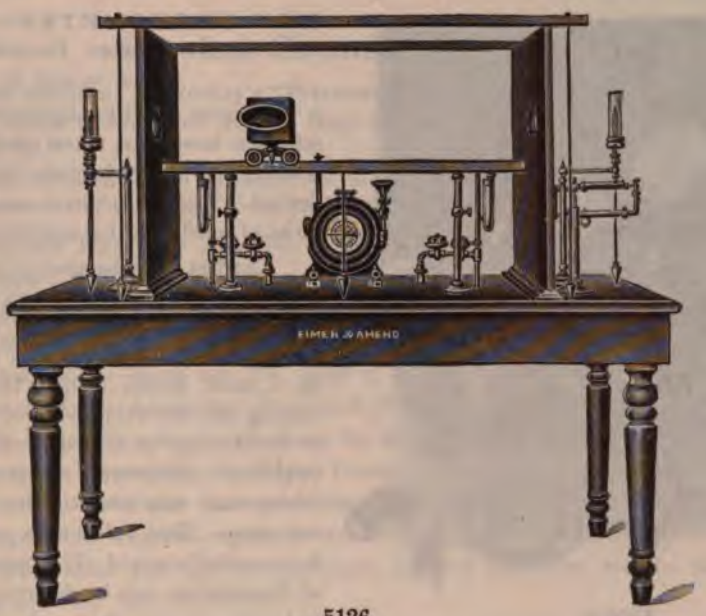
PERCOLATING JARS—See **Jars.**

Photometers

5126. **PHOTOMETER—Bunsen system, American standard, type B, ordinary form,** as used by gas works, etc.; consists of a bar accurately graduated (60 in.), mounted on adjustable supports, sighting box and carriage, wet test meter, complete candle balance, gas pillars, Argand burner, two double dry governors, plumb bobs, chimney and candles; complete **525.00**

For cut, see next page.

5128. **Ditto**—with 100 inch bar; complete as above..... **575.00**



5126

5129. **PHOTOMETER—Type B, Improved form 60" bar**—Similar to No. 5126, but arranged so that meter and other working parts are together at one end. The tracks are of metal, and the movable screens are of sheet metal **670.00**

5129/1. **Ditto—100" bar** **720.00**

Accessories for Photometers Nos. 5126 to 5129/1

a. **Extra Lighting Box** **60.00**

b. **Edgerton Standard Screen**—This is a thin metal screen which fits over the glass chimney of a D Argand burner. It is very generally used as a standard for candle power on bar photometers, particularly in gas works where frequent tests are made and a standard is desired which will give readings sufficiently accurate for keeping watch of the value of the gas **3.00**

c. **Argand Burner D**—As a rule, the best results for candle power of gas are obtained with this standard burner **4.00**

d. **Elliott Standard Kerosene Oil Photometer Lamp**—Advise whether 5 or 10 candle power screen is desired **40.00**

e. **Standard Candles**—long, 6 to the pound; per lb. **2.60**

f. **Standard Candles**—short, 12 to the pound; per lb. **2.60**

g. **Stop Clock**—with minute bell, fitted with a starting and stopping device **35.00**

Stopwatch—see No. 6512.

Standard Pentane Lamp—see No. 3630.

Double Dry Governor—see No. 5958.

Candle Balance—see No. 425.

Gauge—see No. 2732.

Meter—see No. 5624.

5129/5

5129/5. PHOTOMETER—Macbeth Illuminometer, Portable. Scale is calibrated to read in foot-candles.

In using the Illuminometer to measure illumination intensities, a test plate is placed at the point in the plane where the illumination value is desired. This test plate is made of a white material of good diffusing qualities.

The test plate becomes a secondary source of light, the brightness of which is compared with that of a translucent screen within the instrument which is illuminated to a known intensity by a small Mazda lamp. The device is direct reading and the values secured give the intensity of illumination on a given surface. In measuring brightness a separate standardization is made, taking into consideration the absorption of the test plate. This value is in terms of "apparent foot-candles" emitted. The intensity of any source of illumination may be determined by placing the test plate a known distance from the source, measuring the illumination intensity in foot-candles upon the test plate and then computing the candle-power by multiplying the scale values by the square of the distance of the test plate from the unknown source (the law of inverse squares).

Attention is drawn to the following important points:

1. The scale follows the inverse square law and is theoretically correct and not experimentally determined for each instrument.
2. A Lummer Brodhun cube is used, as it is more sensitive than any other type of screen and permits a quicker and more accurate balance.
3. A direct and simple means is provided for standardizing the Mazda working standard lamp within the instrument.

The three main parts are the **Illuminometer,** the **Controller** and the **Reference Standard.**

The **Illuminometer** consists of a Lummer Brodhun cube mounted in a rectangular head.

The **Controller** comprises the battery for operating the lamps, a Weston milammeter, two close regulating rheostats, and a double throw switch, by means of which the milammeter may be brought into either the working standard circuit or the reference standard circuit.

The **Reference Standard** consists of a metal housing in which is mounted a standardized lamp, fully protected with diaphragm screens.

Macbeth Illuminometer, Complete as above described, including Illuminometer, Controller, Reference Standard, Tripod, two Absorbing Screens (range about .02 to 800), Test Plate, Horn with Translucent Test Plate, two extra Working Standard Lamps and Carrying Case	**200.00**
a. Illuminometer only	**100.00**
b. Controller	**80.00**
c. Reference Standard	**20.00**
d. Tripod	**7.50**
e. Absorbing Screens ..... each	**6.00**
f. Test Plate	**12.00**
g. Horn, including Translucent Test Plate	**17.00**
h. Color Filter for daylight determinations	**9.00**
j. Additional Working Standard Lamp	**2.00**
k. Clamp for fastening Illuminometer to Tripod	**10.00**
l. Carrying Case ..... price on application	
m. Restandardization of Reference Standard	**5.50**

Physical Chemical Apparatus

Apparatus, as described in Findlay's "Practical Physical Chemistry," Longmans, Green & Co., 1919, and in the books of the same title by Gray and Firth respectively. Numbers without notation refer to Findlay's list.

(All figures not included in the appended list are either duplications, illustrations of details, or of apparatus not considered of sufficiently wide application to warrant their being listed.)

Fig. 1.	**Regnault Flask**—see No. 1093.
Figs. 3 & 4.	**Ostwald Calibrating Pipette**—see No. 5194.
Fig. 6.	**Hulett design picnometer**—see No. 1099.
Firth, pg. 12.	**Picnometer**—for determining Specific Gravity at Higher Temperatures, see No. 4565.
Fig. 9.	**Gas Balloons**—glass, see Nos. 3642 & 3644.
Fig. 11.	**Victor Meyer Apparatus**—for Vapor Density, see No. 7354.
Fig. 12.	**Side Tube Burette**—for substitute for gas burette, see Nos. 1308 & 1310.
Fig. 13.	**Lumsden Apparatus**—for Vapor Density, at constant volume, see No. 7363.
Fig. 17.	**Toluene Filled Gas thermo-regulators**—see Nos. 5946, 5948 & 5952.
Fig. 19.	**Large Bulb Thermo-regulator**—gas, see No. 5944.
Fig. 20.	**Toluene filled gas thermo-regulators**—for cool regulation, see No. 5953.
Fig. 22.	**Stirrers**—see Nos. 6408–6414.
Fig. 24.	**Toluene Filled Thermo-regulator**—for electrical control, see No. 5950.
Fig. 26.	**Ostwald Viscosity Pipette**—see No. 5196, see also Bingham and Green Viscometer.
Fig. 22 Gray	**Pipette, Donan**—to show emulsifying Power of a Liquid, see No. 5265.
Fig. 28.	**Apparatus**—to determine Molecular surface Energy and Association Factor of Liquids, see No. 4569.
Fig. 29.	**Traube Stalagmometer**—see No. 4568.
E. & A.	**Morgan drop-weight apparatus**—see No. 4567.
Figs. 34 & 37.	**Refractometer**—see Nos. 5844–5868.
Fig. 38.	**Polariscope Observation Tube**—see No. 5514.
Figs. 40 & 41.	**Spectroscope**—see No. 6314/1.
	Five Chlorides—for calibrating spectroscope scale, see Spectroscopes.
Fig. 42.	**Freezing Point Apparatus**—see No. 4534.
Fig. 43.	**Differential thermometers**—Beckman, see Nos. 6804–6816.
Fig. 44.	**Pastille Press**—see No. 5572.
Fig. 46.	**Beckman Boiling-point Apparatus**—see No. 4552.
Fig. 7 Gray	**Apparatus**—For Determination of Vapor Tension by Dew Point Method, see No. 7365.
Fig. 47.	**Weighing-pipette**—for introducing liquids into freezing point and boiling point apparatus, see No. 4534a.
Fig. 49.	**McCoy Boiling-Point Apparatus**—see No. 4562.
Fig. 50.	**Menzies Boiling-Point Apparatus**—see No. 4566.
Firth, pg. 28.	**Boiling-Point Apparatus**—Electrically Heated, see No. 4559.
Fig. 51.	**Burette**—with reservoir for Baryta Solutions, see No. 1344.
Fig. 56.	**Conductivity Cells**—see Nos. 5198–5217/2.
Fig. 58.	**Electric Commutator**—see No. 5159/2.
Fig. 59.	**Slide-Wire Bridge**—see No. 5150/1.
Fig. 66.	**Transport (Transference) Number Apparatus**—see No. 5193.
Fig. 66A. (Left hand cut)	**Transport (Transference) Number Apparatus**—see No. 5193/1.
Fig. 66A. (Right hand cut)	**Mercury Cathode**—see No. 5193/1b.
Fig. 68.	**Cadmium Standard Cell**—see No. 5181/1.

(Continued on next page)

PHYSICAL CHEMICAL APPARATUS—Continued.

Fig. 70. **Mercury Purifying Funnel**—see No. 2731.

Fig. 72. **Short-circuiting Key**—see Nos. 5159 & 5159/1.

Fig. 74. **Capillary Electrometer**—see No. 5163.

Fig. 78. **Calomel Electrodes**—see Nos. 5189 & 5190.

Fig. 80. **Apparatus for Electrode Potentials**—see No. 5166.

Fig. 84. **Hydrogen Electrode Vessel**—see No. 5191/3.

Fig. 92. **Calorimeter**—for Heats of Reaction. It is suggested that student make up his own apparatus, using Dewar Flask and cork to fit; see Nos. 7236–7240.

Fig. 95. **Calorimeter**—for Heats of Combustion, see Calorimeter section.

APPARATUS FOR DETERMINING THE CONDUCTIVITY OF ELECTROLYTES

The most used method of measuring electrolytic conductivity is that of the Wheatstone Bridge, developed by Kohlrausch, using alternating currents. For work of precision—say better than 1/25%, it is absolutely essential to have a source of power giving a frequency that is constant, free from harmonics, and having a sine wave-form. It is also essential to have the coils used to balance the resistance to be measured practically free from capacity and inductance, a condition met by the Curtis coil.

If a source of direct current is available, such as 110-D. C. lighting circuit, the "Vreeland Oscillator" is an excellent means for producing a sine wave e.m.f. of any desired frequency, with freedom from harmonics.

If only the 110–60 cycle A. C. lighting circuit is to be had, the best source of alternating current giving considerable power is a Constant-Speed High-Frequency generator with parallel condensers to permit of the circuit being adjusted for resonance. This gives 1000 cycles, and is not capable of any adjustable variation. For use with battery power a "Tuned Oscillator" is most serviceable.

As a detector, a tunable telephone is the best at present.

For all work, a condenser across the resistance-box, to balance capacity in the electrolytic cell, is necessary.

Conductivity Cells are of various types and prices, varying with the solutions to be worked with. One each of high constant, medium constant, and low constant would be required for the usual range of work encountered in the laboratory. Numbers 5200 and 5202 are serviceable for general use. Those described by Washburn, Jour. Am. Chem. Soc., 38 (Nos. 5217–5217/2), are highly desirable for refined work.

A thermostat for control of the temperature of the solution being measured is demanded by work even of fair accuracy, since the conductivity of solutions changes about 2% per degree C. This should be automatic in its action, motor-stirred, and oil-filled. (See Nos. 5133 and 5133/1.)

Sources of Power

VREELAND OSCILLATOR—500 or 1000 cycles, see No. 5137.

HIGH FREQUENCY GENERATOR—see No. 5137/1.

PARALLEL CONDENSERS—for same, see No. 5137/1a.

TUNED OSCILLATOR, see No. 5137/2.

Accessories

RESISTANCE BOXES, see No. 5153.

SLIDE WIRE BRIDGE—Kohlrausch, with extension coils, see No. 5151/2.

TELEPHONE—Tunable, with head-piece, see No. 5137/4.

CONDENSER—to compensate capacity in Electrolytic Cell, approximate capacitance .003 M.F., see No. 5143.

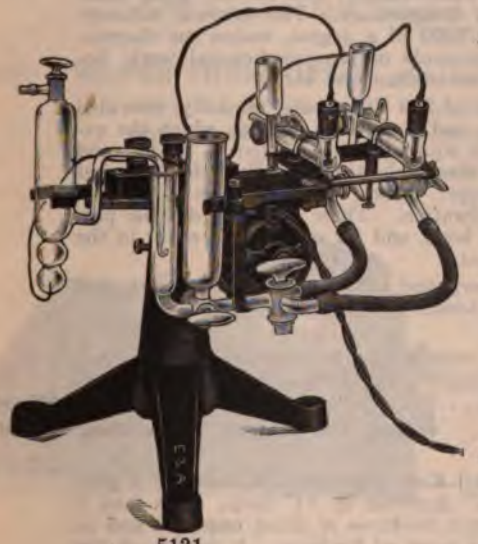
Ditto—approximate capacitance 700 M.M.F., see No. 5143/1.

THERMOSTAT—see Nos. 5133–5133/1.

CONDUCTIVITY CELLS—see Nos. 5198–5217.

The conductivity outfit described on the preceding page is intended for more exacting requirements. The following assemblage is recommended for **Students'** use.

A. **Tuned Oscillator**—see No. 5137/2.
B. **Bridge**—see Nos. 5150/1 or 5150/2.
C & E. **Resistance Box**—see Nos. 5151 and 5151/1.
D. **Conductivity Cell**—see Nos. 5198, 5202, and 5204.
F. **Air Condenser**—see Nos. 5143 and 5143/1.
G. **Key**—see Nos. 5159 and 5159/1.
H. **Telephone**—Double with head band, see No. 5137/4.


5131

APPARATUS FOR THE DETERMINATION OF HYDROGEN-ION CONCENTRATION

LEEDS & NORTHRUP POTENTIOMETER—see No. 5135.

GALVANOMETER—for same, resistance 1000 ohms, see Nos. 5141 and 5141/1.

Lamp and Scale—for galvanometer No. 5141/1, see No. 5141/1a.

STANDARD CELL—Eppley, see No. 5181.

5131. **HYDROGEN-ION CONCENTRATION ELECTRODE**—consisting of a, b, c, d, and e, mounted on a motor-driven shaking device, making one unit. Complete with vessels and shaker **100.00**

a. **Iron Tripod Stand**—with motor, etc. **75.00**
b. **Clark Hydrogen Electrode Vessel**—(glass) **9.00**
c. **Platinum Electrode**—(glass tube and platinum wire) **4.00**
d. **Calomel Electrode Vessel**—(glass) **4.00**
e. **Connecting Vessel**—(glass) **7.75**

State voltage and specify whether A.C. or D.C.

5132

5132/1

Freas Sensitive Water Thermostats

Descriptive booklet sent upon request

5132. **THE FREAS SENSITIVE WATER THERMOSTAT—Large size, Patented.** Designed to furnish continuous constant temperature for the range of temperature on the lower limit of the available hydrant water supply, and on the upper limit of about 50 degrees C. in a room of ordinary temperature. The extreme accuracy and small variation which does not exceed 2/1000 of a degree, makes the thermostat especially suitable for the refined measurements of physico-chemical work, botanical investigations, exact specific gravity determinations, etc.

The outfit consists of a well insulated tank of 340 liters water capacity, provided with spacious glass windows for observations, and perforated shelf on which the experimental work can be placed. The tank is equipped with a stirring device, and a mercury regulator which controls the heat through a thermal relay; low thermal capacity, long cylindrical form filament lamps; motor, suspended on adjustable springs to eliminate vibratory noise and vibration. There are also devices provided for maintaining the water at constant level, and for cooling the water in the tank when the room temperature is too great.

This is justly considered the most satisfactory and reliable water thermostat, that can be depended upon for continuous unattended operation.

WATER THERMOSTAT—as above described, with regulator (without mercury), motor, etc., complete as illustrated, ready to connect with water supply, drain and current **480.00**

crating and packing, extra about 30.00

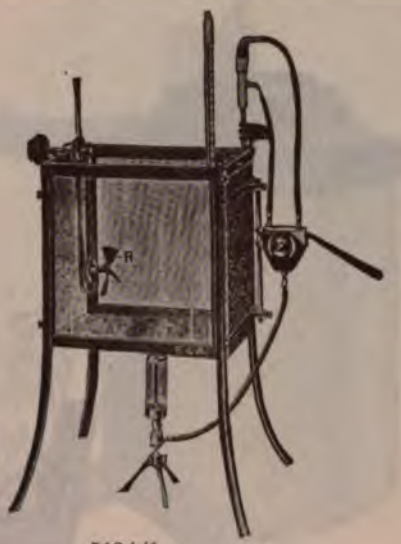
5132/1. **THE FREAS WATER THERMOSTAT—Small Size, Patented.** Consists of a glass tank of about ten gallons capacity about 15" diameter by 14" deep. This tank is covered on the outside with horse hair felt to a thickness of about **one** inch and on the outside of this felt insulation is placed a cover of linoleum. A portion of this tank, a strip about one inch wide extending from top to bottom, is not covered with insulation and serves as a window through which the operator can observe his work.

Regulation is by means of the **Freas Mercury Thermo-Regulator** and is sensitive to 1/100° C. Heating is by means of two electric lamps.

A stirring device is operated by an electric motor suspended by means of two springs as shown in cut. This stirring device keeps the water in the tank in constant and thorough agitation **220.00**

When ordering state particulars of current, voltage and whether alternating or direct.

5133



5134/1

5133. **THERMOSTAT—For water or oil,** capacity about 150 liters. Stirrer-shaft enters through bottom of bath without stuffing box, doing away with leakage problem when oil is used, and leaving top of bath clear. Container tank of copper, covered with asbestos-wood and cellular asbestos heat insulating material; adjustable shelf in tank; water cooling coil. For **gas** heating, complete with toluene regulator, gas-pressure regulator and stirrer, without thermometer and motor to operate stirrer .. **325.00**

5133/1. **Ditto**—For **electric** heating, with all heating coils and electrical regulating devices enclosed in case of bath, complete without thermometer and motor **400.00**

5134/1. **WATER THERMOSTAT**—with transparent front and back for viscosity determinations and the like. For temperatures under 60° C. Complete as shown for gas regulation but without thermometer **150.00**

See also **Bingham and Green Viscosimeter Bath** under **Viscosimeters.**

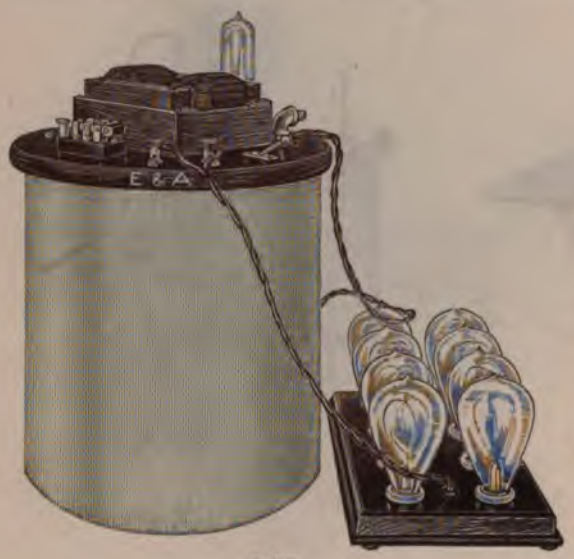
5135

5135/1

5135. **POTENTIOMETER—L. & N.,** Complete with regulating rheostat **275.00**

5135/1. **POTENTIOMETER—L. & N.,** Students' **75.00**

5137. **OSCILLATOR—Vreeland,** for producing sine wave e.m.f. of 500 or 1000 cycles. For cut, see next page **325.00**



5137

5141

5137/1. **HIGH FREQUENCY GENERATOR—Constant Speed,** to operate on either D. C. or A. C. current. Constancy of speed is to within ¼ of one percent, has governor so that the frequency can be adjusted **150.00**

5137/1a. **PARALLEL CONDENSERS**—for No. 5137/1 ..... **220.00**

5137/2. **TUNED OSCILLATOR**—for cut see "A," Students' Conductivity Outfit, page 421... **32.00**

5137/3. **TUNABLE RECEIVER** **20.00**

5137/4. **TELEPHONE—Double,** with head band, for cut see "H," page 421 ..... **16.00**

5141. **GALVANOMETER—Portable,** with lamp and scale, resistance 1000 ohms, period three seconds **55.00**

5141/1. **GALVANOMETER**—for Hydrogen-ion work of **precision** **50.00**

5141/1a. **LAMP AND SCALE**—for No. 5141/1 ..... **35.00**

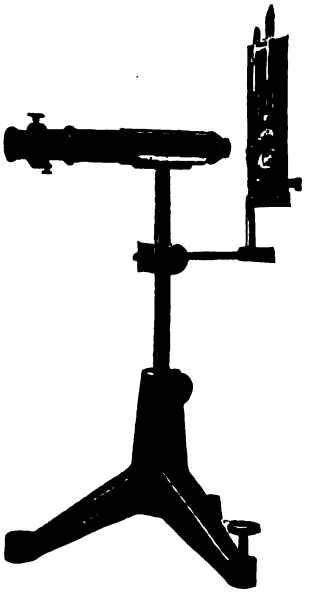
5143. **ROTARY ADJUSTABLE AIR CONDENSER**—Maximum capacity about .003, minimum about .00005 microfarad..... **29.00**

5143/1. **ROTARY ADJUSTABLE AIR CONDENSER**—Approximate capacity 700 mmf. For cut, see "F," page 421 ..... **13.50**

5150/1. **SLIDE-WIRE BRIDGE**—A resistance wire stretched over a one meter scale divided in millimeters. A slider with a knife-edge makes contact with the bridge-wire, and permits the balance to be read in terms of length **20.00**

5150/2. **SLIDE-WIRE BRIDGE—Student, Kohlrausch.** For cut, see "B," page 421 ..... **40.00**

5159/2



5163

5151. **RESISTANCE BOX—Dial Decade,** 0–9999 ohms. Resistance units wound on wooden spools. For cut, see "C," page 421 ..... **50.00**

5151/1. **RESISTANCE BOX**—similar to above, but with brush contacts and non-inductive winding. For cut, see "E," page 421 ..... **53.00**

5151/2. **KOHLRAUSCH SLIDE-WIRE BRIDGE**—with extension coils which are provided to increase the effective length of the slide-wire. These coils are each exactly 4½ times the resistance of the slide-wire so that the latter is 1/10 of the total resistance. The end coils may be cut out of circuit, if desired, by means of plugs **100.00**

5153. **RESISTANCE BOX—Curtis Coils,** hand wound. Practically free from capacity and inductance, accurate to 1/25%; five dials, 10x1+9 (10+100+1000+10000) ohms .. **270.00**

5159. **KEY—Single contact and short circuiting,** especially intended for use with D'Arsonval galvanometers used with zero deflection method. For cut, see "G," page 421. **13.00**

5159/1. **KEY—Single contact, for students' use.** Springs are of brass, posts of hard rubber, contacts of hard drawn silver, bases of hard wood. For cut, see "G," page 421..... **4.50**

5159/2. **KEY—Commutator, Pohl,** an insulating block with six mercury cups and terminals. It can be used either for reversing the direction of the current in a circuit, or to connect either arm of a branched circuit, by simply rocking the switch **15.00**

5163. **CAPILLARY ELECTROMETER—Eppley.** Contents sealed in exhausted glass tube, making impossible loss of sensitiveness due to soiling of capillary by entry of outside impurities. Micrometer eyepiece with adjustable scale, permitting of exact setting against top of mercury column. Each instrument is tested for maximum workable sensitivity before being passed for shipment **105.00**

5166

5166. **HALF ELEMENT—Set of two** glass vessels on adjustable supports, with mercury contacts and binding posts, metal electrodes, a, b, c and d as illustrated **27.00**

Separate Parts

5168. **Half Elements,** on stand, without the metal electrodes, set of two **12.00**

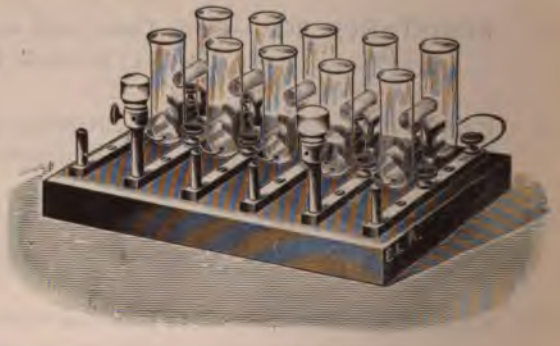
5170. **2 Platinum Electrodes, fig. c,** platinum foil and rubber stoppers **4.00**

5172. **2 Platinum Electrodes, fig. e,** "sealed in" platinum rings and rubber stoppers **4.50**

5174. **3 Silver Electrodes, fig. d,** glass rods with fused in platinum rods on which a silver spiral is soldered **5.50**

5176. **1 Each, Zinc and Copper Electrodes, figs. a & b,** with rubber stopper **2.00**

5178



5180

5178. **H VESSEL—For Cadmium Normal Element,** mounted on board, with two binding posts; to be filled by user **4.00**

5180. **ELEMENTS—Battery of five H-vessels,** mounted on board, and so arranged that they may be connected in series, or used alone as required **20.00**

5181

5181/1

5181. **CADMIUM STANDARD CELL—Eppley,** unsaturated type, with negligible temperature coefficient. The entire system is hermetically sealed in glass, thus making impossible lowering of electromotive force and raising of temperature coefficient, due to concentration of the cell-solution by evaporation. Mounted in moulded box, including Certificate of value **15.00**

5181/1. **Ditto**—unmounted **11.00**

5181a. **Bureau of Standards Certificate** .....**extra** **3.00**

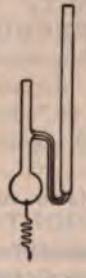
5181/2. **CADMIUM STANDARD CELLS—Eppley,** for use with Electrometer, 100 Cells, each of approximately 1.01 volt, mounted in mahogany case with cover, and connected so that voltages corresponding to each group of ten can be tapped off..... **150.00**

5181/10. **CLARK STANDARD CELL—Eppley** (Zinc Amalgam, Zinc Sulfate) mounted... **15.00**

5181/11. **Ditto**—unmounted **11.00**

5181/10a. **Bureau of Standards Certificate** .....**extra** **3.00**

5184



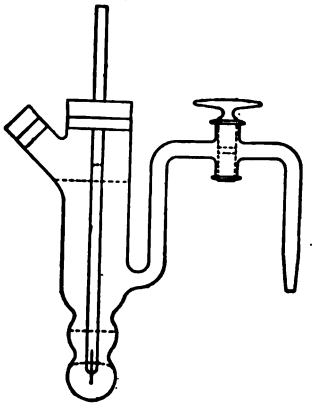
5186

5188

5184. **ELECTROMETER TUBE—Glass,** with round bore ..... **.75**

5186. **Ditto**—with platinum wire sealed in bulb..... **3.00**

5188. **Ditto**—with connection tube, sealed in wire, and bent tube **3.75**



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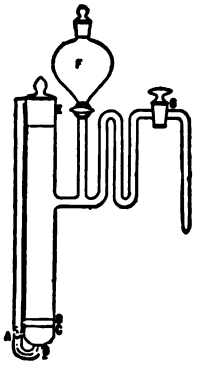
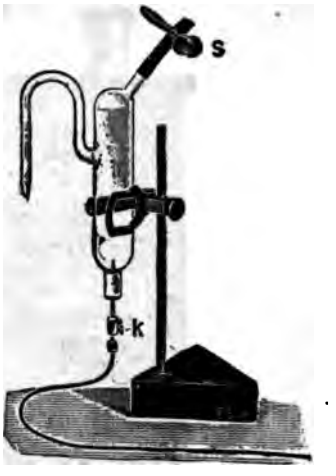


5189/1



5190

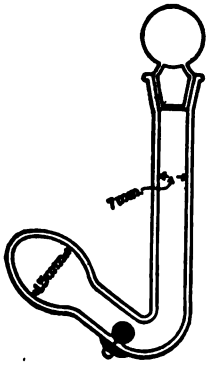
5189. **CALOMEL ELECTRODE—Fales** (Jour. Am. Chem. Soc., XL, 9, p. 1291) **5.00**

5189/1. **CALOMEL ELECTRODE—G. N. Lewis** (Jour. Am. Chem. Soc., XXXIX, 11, p. 2245) **13.00**

5190. **CALOMEL ELECTRODE—Glass Vessel,** with fused in platinum wire and copper rod; on adjustable stand **7.00**

5190/1. **Ditto**—but with stopcock on bent tube **8.50**

Note:—All of the above are unfilled.



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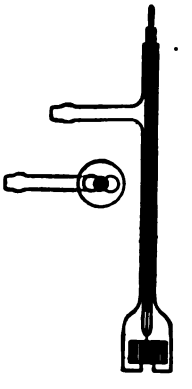
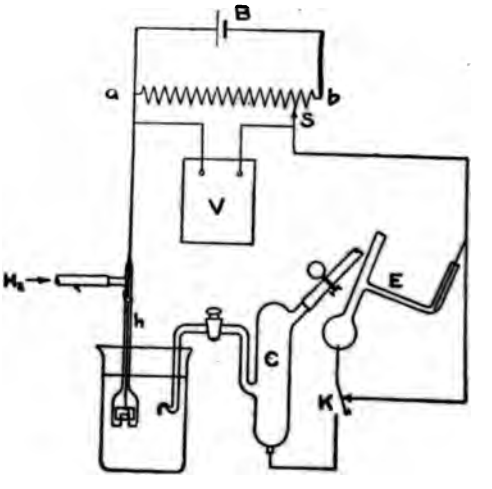


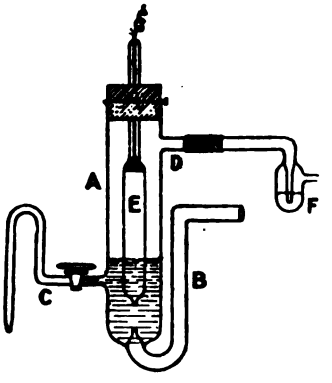
5191/1



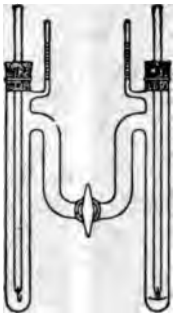
Diagram

5191. **HYDROGEN ELECTRODE—Bailey** (Jour. Am. Chem. Soc., XLII, 1, p. 45) **4.00**

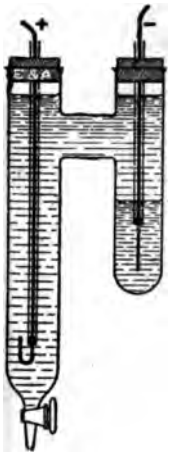
5191/1. **HYDROGEN ELECTRODE—Hildebrand,** for end-point determinations (Jour. Am. Chem. Soc., XXV, 7, p. 848). Diagram to right of Electrode shows connections according to Hildebrand (Jour. Am. Chem. Soc., XXV, 7, p. 851). "C" is a calomel electrode which furnishes the comparison potential against which that of the hydrogen electrode "H" is compared. "B" is the measuring battery, "a–b" a variable rheostat, "V" a voltmeter, and "E" a capillary electrometer which may be used instead of the voltmeter if desired. It has the advantage of not taking appreciable current from the hydrogen electrode. Electrode only **12.00**



5191/3



5192



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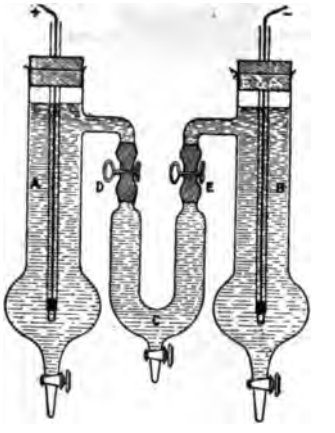


5193/1

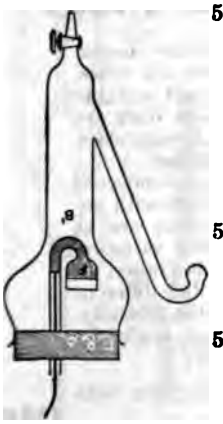
5191/3. **HYDROGEN ELECTRODE**—A glass container with a side connector-tube "C," and a gas-inlet tube "B," the gas emerging through the trap "F." When equilibrium is established between the hydrogen gas surrounding the electrode "E" and that absorbed in it, a potential difference exists between the absorbed gas, which acts like a metal, and the hydrogen-ions in the liquid in which "E" is immersed
price on application

5192. **APPARATUS**—Jones & Basset, for determining migration velocities of ions, with electrodes as specified ..... **price on application**

5193. **TRANSPORT (TRANSFERENCE) NUMBER APPARATUS**—An H-shaped tube with legs of unequal length, the longer of which is provided with a stopcock at its lower end. Electrodes of the metal, the transport number of whose ions is to be determined, are fastened in the two legs by means of rubber stoppers, after filling the vessel with a solution of a salt of the metal selected. After the passage of a known quantity of electricity, analysis of the various portions of the tube-contents provides the data from which the transport number is calculated; complete without electrodes **5.00**

a. Silver electrodes **3.50**

b. Copper electrodes **2.50**

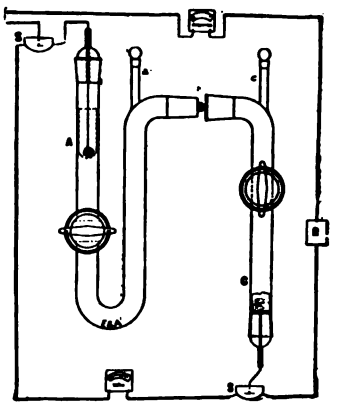


5193/1b

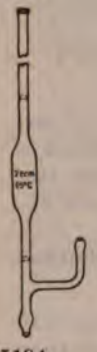
5193/1. **TRANSPORT (TRANSFERENCE) NUMBER APPARATUS** — Improved Design, permitting analysis of "intermediate solution" as well as of cathode solution. Glass parts only **15.00**

5193/1b. **MERCURY CATHODE**—for the above for use when gas is given off during electrolysis **8.00**

5193/2. **TRANSFERENCE APPARATUS and ELECTRODES**—Washburn (Jour. Am. Chem. Soc., XXI, 3, p. 322)
price on application

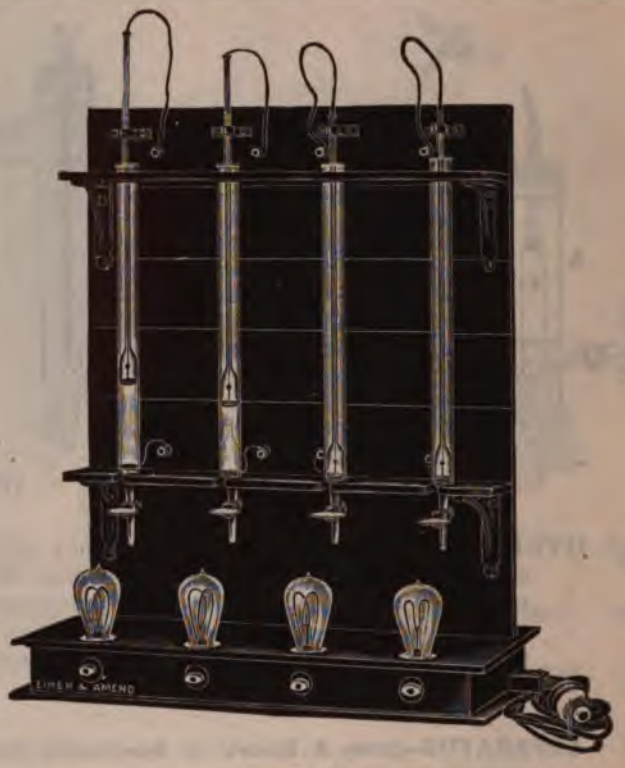


5193/2



5194

5196



5197

5194. **CALIBRATING PIPETTE—Ostwald,** capacity 1, 2 or 5 cc. .....each .80

CALIBRATING PIPETTE—Morse, see No. 1350.

5196. **VISCOSITY PIPETTE—Ostwald,** emptied in 80 to 100 seconds 1.50

Conductivity Apparatus

LECTURE APPARATUS for demonstrating the variation in conductivity in different solutions of changing strength. (See Journal of the American Chemical Society, p. 736, 1900—A. A. Noyes and A. A. Blanchard.) Apparatus as modified by Prof. Thos. B. Freas.

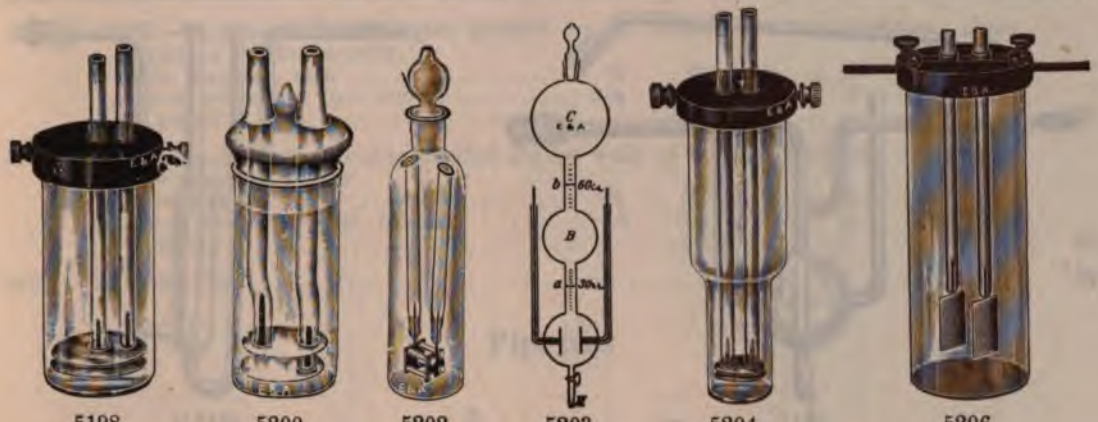
The apparatus consists of four glass tubes each fitted with a platinum electrode, the tubes having a stopcock at the lower end to facilitate the removal of solutions and cleaning. Each tube is provided with a plunger tube having a bulb of white glass, to the bottom of which is sealed a platinum plate—the bulbs are of white glass to render them observable at a distance.

The stand is made of black fireproof material—it is equipped with four electric lamps each wired in series with its corresponding glass tube, a support for the tubes, spring clamps to firmly hold the plunger tubes at any height desired, and suitable terminals for connecting the platinum wires from the electrodes. White lines are marked on the support back of the tubes for easy observation by a distant class. The wiring is enclosed in metallic tubing and properly and neatly concealed.

To operate, the apparatus is set up as shown in the illustration, and then connected to D. C. lighting circuit of 110 volts. If now the tubes are partially filled with solutions of electrolytes of the same concentration, and the upper electrodes are at the same height, the variation in brilliancy of the lamps will indicate the variation in conductivity of the solutions; or if the different upper electrodes be raised to such a point that the brilliancy of the series lamps be uniform, then the different heights of the upper electrodes will show to the class the variation in conductivity. The effect of dilution of electrolytes and neutralization of acids and bases can easily be demonstrated to a class by this apparatus.

5197. **LECTURE CONDUCTIVITY APPARATUS**—as above described, complete with platinum electrodes 135.00

5197a. Extra Glass Tubes with plunger tube, complete with platinum electrodes.....each 20.00



5198 5200 5202 5203 5204 5206

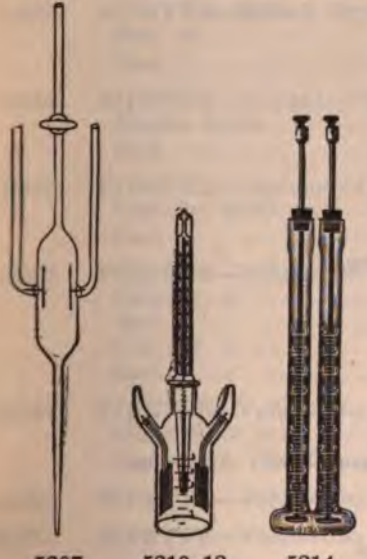
Prices quoted are approximate, depending on the weight of platinum and the market price of the metal.

5198. **CONDUCTIVITY CELL—Arrhenius** **36.00**

5200. **CONDUCTIVITY CELL—Arrhenius, improved by Jones,** glass stoppered; specially designed for use with non-aqueous solutions, but equally desirable for use with aqueous solutions, to prevent evaporation **40.00**

5202. **CONDUCTIVITY CELL—Freas.** This cell is provided with platinum plates 1 cm. square, rigidly set at a fixed distance apart, and held at this distance by glass pins. The ground glass stopper avoids the use of a rubber cap which might be attacked by the solvent; furthermore, evaporation cannot take place. The platinum connecting wires are protected by being sealed in the tubes, in which are placed a few drops of mercury, making a perfect contact **14.00**

5203. **CONDUCTIVITY CELL—Cantor.** In this cell a series of dilutions can be made and measured with great rapidity, no other graduated vessels being necessary after the first solution of highest concentration has been prepared **42.50**



5207 5210–12 5214

5204. **CONDUCTIVITY CELL—Ostwald** **20.00**

5206. **Ditto**—with vertical electrodes, space between electrodes adjustable **22.50**

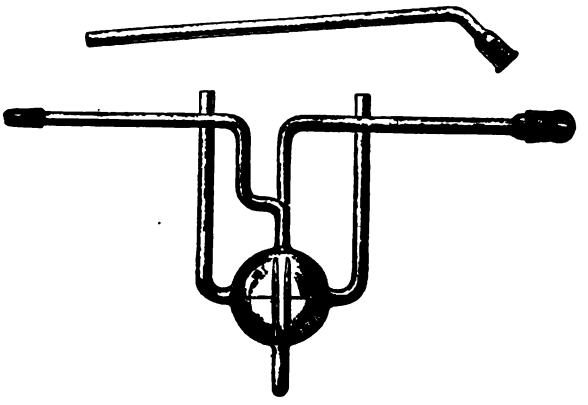
5207. **CONDUCTIVITY CELL**—pipette and stopcock. **13.00**

5210. **CONDUCTIVITY CELL—Kohlrausch,** stoppered; graduated in ½ cc. **24.00**

5212. **Ditto**—with ground in thermometer **28.00**

5214. **CONDUCTIVITY CELL—Kohlrausch,** with horizontal electrodes, of changeable capacity; up to 90 capacities graduated in ½ capacities **12.50**

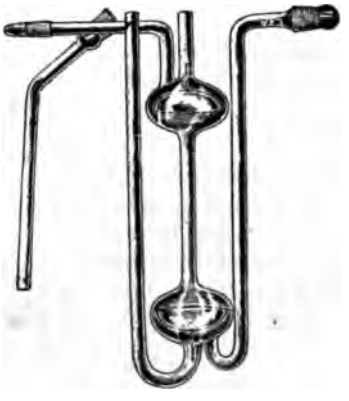
5216. **Ditto**—graduated in 1/1 capacities **11.00**



5217

5217/1

5217. **CONDUCTIVITY CELL—Washburn, Type A.** For electrolytes of low conductivity, such as conductivity water and dilute solutions of many organic compounds. Range 10^{-5} to $2x10^{-7}$ reciprocal ohms .....**price on application**



5217/2

5217/1. **CONDUCTIVITY CELL—Washburn, Type B.** For electrolytes of medium conductivity. Range $2x10^{-3}$ to $2x10^{-6}$ reciprocal ohms
price on application

5217/2. **CONDUCTIVITY CELL — Washburn, Type C.** For electrolytes of high conductivity. Range 10^{-1} to $3x10^{-4}$ reciprocal ohms
price on application

For Apparatus used in Physical Chemistry not included in the foregoing section, see the various headings. For example:

Ammeters.
Balances.
Batteries.
Burettes—calibrating, standard, etc.
Calorimeters.
Electrometers—see Radium Testing Apparatus.
Furnaces.
Gas Testing Apparatus.
Hydrometers.
Induction Coils.
MacLeod and Other Vacuum Gauges—see Gauges.
Microscopes.
Molecular Weight Apparatus.
Osmotic Pressure Tube—see Molecular Weight Apparatus.
Photometers.
Picnometers—see Bottles, Specific Gravity.
Polariscopes.
Pyrometers.
Refractometers.
Resistances and Rheostats—see Rheostats.
Spectroscopes.
Stills—see Distilling Apparatus.
Surface Tension Apparatus—see Surface Tension and Vapor Density Apparatus.
Thermometers.
Thermo Regulators—see Regulators.
Vacuum Pumps—see Pumps.
Viscosimeters—see Oil Testing Apparatus and Viscosimeters.
Voltmeters.

5218. **PIPE—Pure block tin.** Weights specified are for walls of medium thickness. Other sizes or weights to order.

Inside diameter, inch	¼	5/16	⅜	½	¾	1
Approx. weight per foot, ounces	3½	4	5	6	11	14

Per pound **2.00**

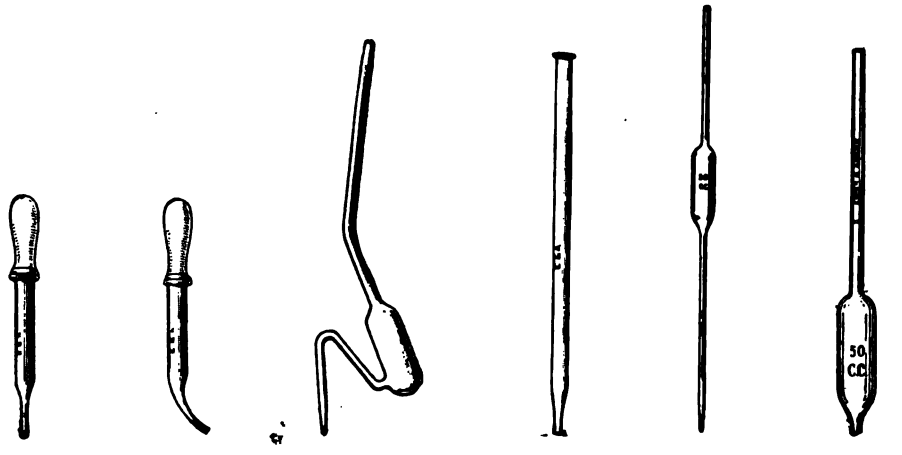
5220. **PIPE—Best Lead.** Weights specified are for walls of medium thickness. Other sizes or weights to order.

Inside diameter, inch	⅜	7/16	½	⅝	¾	1
Approx. weight per foot, ounces	16	16	20	32	36	52

Per pound ..... **.25**

5222. **PIPES—Clay** ..... dozen **.50**

Pipettes



5224 5226 5227 5228 5232 5234

The Pipettes listed below are those in ordinary use. Special Pipettes made to order on request.

5224. **PIPETTE—Small,** with rubber bulb, straight end ..... each **.05**
dozen **.50**

5226. **Ditto—Bent End** ..... each **.05**
dozen **.50**

5227. **PIPETTE—Siphon, Struthers.**

Size, cc.	25	50
Each	.65	.80

5228. **PIPETTE**—Straight, drawn to a point.

Length, inches	6	7	8	10	12	15	18
Each	.10	.10	.10	.12	.13	.15	.18

5230. **PIPETTE**—Ungraduated; with bulb same shape as No. 5232.

Capacity, about, cc.	5	10	25	50	100	200
Each	.12	.14	.25	.35	.45	.80

5232. **PIPETTE—Volumetric,** accurately graduated.

Capacity, cc.	1	2	3	4	5	10	12½
Each	.20	.20	.20	.20	.20	.25	.30
Capacity, cc.	15	20	25	50	75	100	200
Each	.33	.35	.40	.55	.60	.70	1.15

5234. **PIPETTE—Volumetric, short form,** accurately graduated.

Capacity, cc.	5	10	20	25	50	100	200
Each	.20	.25	.35	.40	.55	.70	1.15

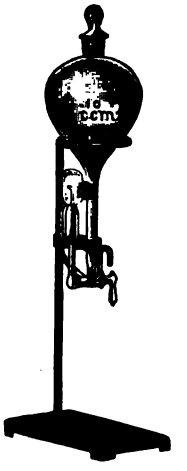
5236. **PIPETTE—Volumetric, Standard,** see page 435.

5237. **PIPETTE—Volumetric, Standard,** see page 435.

5237/1. **PIPETTE—Volumetric, Standard,** see page 435.

5240

5246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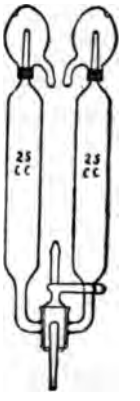
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5240. **PIPETTE—Mohr** accurately graduated in cubic centimeters and fractions.

Capacity, cc....	2/10	1/10	1	1	2	2	5	5	5
Subdivisions, cc.	1/100	1/100	1/100	1/10	1/50	1/10	1/100	1/20	1/10
Each	.45	.40	.45	.25	.45	.30	1.50	.45	.40
Capacity, cc.		10	10	20	25	50	50	100	100
Subdivisions, cc.		1/10	1/20	1/10	1/10	1/5	1/10	1/5	1/10
Each		.50	.55	.65	.85	1.00	1.20	1.60	2.00

5241. **PIPETTE—Mohr,** graduated to tip.

Capacity, cc.	1	1	2	5	5
Subdivisions	1/100	1/10	1/10	1/10	1/20
Each	.45	.25	.30	.40	.45
Capacity, cc.	10	10	25	50	100
Subdivisions	1/10	1/20	1/10	1/10	1/10
Each	.50	.55	.85	1.20	2.00

5242. **PIPETTE—Mohr, Standard,** see page 435.

5243. **PIPETTE—Mohr, Standard,** see page 435.

5243/1. **PIPETTE—Mohr, Standard,** see page 435.

5246. **PIPETTE—Automatic, Bailey, with stand.** Very convenient for quickly delivering a constant approximate amount of reagent, such as sulfuric acid for Kjeldahl nitrogen digestion, etc. The pipette has duplicate measuring vessels, so there is no waste of time waiting for the apparatus to refill after each discharge.

The tube leading from each bulb is fitted with a sliding capillary tube, so that the volume of the pipette can be governed by raising or lowering the height of the capillary tube; thus a pipette of 100 cc. can be used for smaller amounts when desired. Mounted on board for attaching to wall.

Graduated capacity, cc.	10	25	50	100
Each	15.75	15.75	16.00	16.50

5248. **PIPETTE—Automatic, Bleckman,** with reservoir combined, of 1 liter capacity; with iron stand and metal spring clamp. Very compact and rapid.

To deliver, cc's.	5	10	25
Each	25.00	27.50	30.00

5250. **PIPETTE—Automatic, Dafert,** with three-way stopcock.

Capacity, cc.	5	10	25	50	100
Each	3.25	3.50	3.75	4.00	4.50

5252. **PIPETTE—Automatic, G. & F.** The stopcock is made so that one pipette fills while the other empties.

Capacity of each pipette, cc.	10	25	50	100
Each	11.00	12.00	13.00	16.00

5236

5242

PIPETTES, STANDARD PRECISION

5236. PIPETTE—Volumetric, S. S. Standard.

In the manufacture of S. S. Standard Pipettes, our factory follows the instructions and specifications as laid down by the Bureau of Standards as closely and as painstakingly as possible. The most modern appliances, machines and methods of calibrating, approved by the B. of S., are used. The ware in this class will qualify for a B. of S. report. We cannot, however, guarantee that every piece will receive a B. of S. certificate, since the requirements of certification are so exceptionally stringent.

Capacity, cc.	1	2	5	10	25	50	100	200
Each	.85	1.00	1.10	1.25	1.40	1.65	1.90	2.50

5237. PIPETTE—Volumetric, S. R. Standard.

These Pipettes are drawn from our stock of S. S. Standard Pipettes. They have been sent to the B. of S. and have received a **Report.**

Capacity, cc.	1	2	5	10	25	50	100	200
Each	1.75	1.85	1.95	2.10	2.25	2.80	3.00	3.60

5237/1. PIPETTE—Volumetric, S. C. Standard.

These Pipettes are drawn from our stock of S. S. Standard Pipettes. They have been sent to the B. of S. and have received a **Certificate.**

Capacity, cc.	1	2	5	10	25	50	100	200
Each	1.85	2.00	2.10	2.25	2.50	3.10	3.40	4.00

5242. PIPETTE—Mohr, S. S. Standard. (See description of No. 5236.)

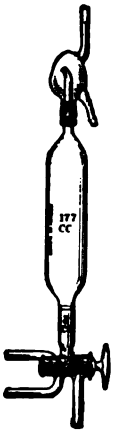
Capacity, cc.	1	5	10	25	50
Subdivisions, cc.	1/100	1/20	1/10	1/10	1/5
Each	1.75	2.00	2.50	3.00	3.50

5243. PIPETTE—Mohr, S. R. Standard. (See description of No. 5237.)

Capacity, cc.	1	5	10	25	50
Subdivisions, cc.	1/100	1/20	1/10	1/10	1/5
Each	3.50	3.70	4.10	4.50	5.00

5243/1. PIPETTE—Mohr, S. C. Standard. (See description of No. 5237/1.)

Capacity, cc.	1	5	10	25	50
Subdivisions, cc.	1/100	1/20	1/10	1/10	1/5
Each	3.75	4.00	4.50	5.00	5.50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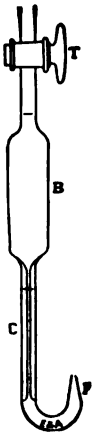
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5264

5254. **PIPETTE—Automatic, Le Docte,** as used in sugar analysis (see A Handbook for Sugar Chemists—Spencer) capacity 177 cc., with mark above stopcock at 5 cc. **12.50**

5255. **PIPETTE—Donnan,** to show emulsifying power of a liquid. (See Gray's Physical Chemistry, Fig. 22.) Consists of a bulb pipette on one end of which is a Geissler stopcock. The other end is a capillary tube having a mark slightly below the bulb, and ending in a bent-up pointed tube **2.75**

5256. **PIPETTE—Mercury,** for taking up mercury that may have been spilt, etc., without the danger of its being sucked into the mouth, as the bulb acts as a reservoir ..... **.80**

5258. **PIPETTE—Overflow, Rickett,** for silver assay; with cup ground on, capacity 100 cc.. **3.00**

5260. **PIPETTE—Rothe,** for rapid estimation of iron as perchloride, by means of ether; graduated to 200 cc. **15.00**
Support .....**extra** **6.00**

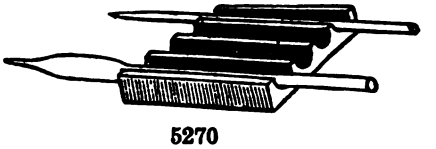
5262. **PIPETTE—Safety,** very useful for acids and poisonous liquids.

Capacity, cc.	2	5	10	25	50	100
Each	**2.75**	**3.00**	**3.25**	**3.50**	**4.00**	**5.00**

5264. **PIPETTE—Bottle,** with a capped pipette ground into neck; very useful for volatile liquids.

With pipette, cc.	10	25	50	100
Each	**prices on application**			

5266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5266. **PIPETTE—Glucose, Spencer,** capacity 50 cc., graduated, 5°–20° Brix, in 1/5ths **1.50**

5268. **PIPETTE—Sucrose,** capacity 52.096 cc., graduated 5°–25° Brix, in 1/10ths **1.75**

5270. **PIPETTE—Rest,** of porcelain ..... **.75**

PIPETTE—Babcock, see Milk Testing Apparatus.

PIPETTE—Blood, see Bacteriological Catalog, Section I.

PIPETTE—Blood Counting, see Bacteriological Catalog, Section I.

PIPETTE—Box, see Bacteriological Catalog, Section II.

PIPETTE—Calibrating, see No. 1350.

PIPETTE—Explosion, also **Gas,** see **Gas Testing Apparatus.**

PIPETTE—Glue, see No. 3790.

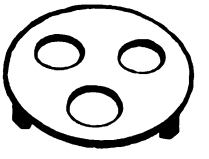
PIPETTE—Support, see No. 6640.

PIPETTE—Viscosity, see Nos. 4810, 5194, 5196.

PIPETTE—Wasserman, see Bacteriological Catalog, Section II.

PIPETTE—Weighing, see Nos. 1152, 1154.

5272



5280

5272. PITCHER—Acid, of stoneware, sizes up to 1 gallon with one handle, others with two handles.

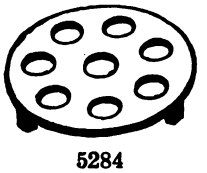
Capacity, pints	1	2	4	8	gallons	2	4	6
Each	1.15	1.20	1.40	1.90		3.30	6.50	7.50

5276. PLATE—Celluloid, for flame examination in testing for K, Li, etc .....each .40

5280. PLATE—Desiccator, of porcelain, on three small feet with 3 to 8 holes according to size of plate.

To fit desiccator, diameter, inches	4	5	6	8	10
Each	.80	1.10	1.50	2.00	3.00

5282. PLATE—Desiccator, of porcelain, 5½ inches diameter, with 4 holes, 28 mm. diameter.. 1.50



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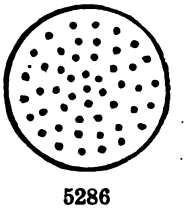

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5284. PLATE—Desiccator, with 8 holes, 26 mm. diameter 1.75

5286. PLATE—Filter, Hirsch, of porcelain; perforated, edges bevelled to fit funnels.

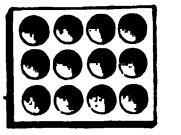
Diameter, cm.	2.5	4	5	6.5	7.5	10
Each	.20	.30	.38	.45	.60	1.00

5290. PLATE—Glass, blue cobalt, for potassium flame test.

Size, inches	2x2	2x3	3x3	3x4	4x4
Each	.10	.15	.25	.30	.35
Dozen	1.00	1.50	2.50	3.00	

5292

5294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5312

5292. **PLATE—Glass, circular,** rough on one side or smooth on both sides; for covering jars, etc.

Diameter, inches	3	3½	4	5	6	8
Each	.10	.12	.14	.18	.27	.40

5294. **PLATE—Glass, circular** as above, with hole in center or on side, for stirrers.

Diameter, inches	3	3½	4	5	6	8
Each	.35	.40	.45	.50	.60	.75

5296. **PLATE—Glass, square,** ground rough on one side.

Size, in., sq..	2	2½	3	4	5	6	8	10	12	15
Each	.06	.08	.09	.11	.15	.18	.30	.40	.60	.90

5298. **PLATE—Glass, heavy plate, square,** ground rough on one side.

Size, inches, sq.	4	5	6	8	10	12	15	20
Each	.40	.45	.55	.85	1.35	1.80	3.40	6.50

5302. **PLATE—Porcelain,** glazed on one side.

Size, inches, sq.	4	5	6	8	10	12
Each	.50	.75	1.00	1.50	2.10	3.20

5304. **PLATE—Porcelain, with cavities,** for color reactions; 4¼x3⅜ with 12 cavities ¾ inch diameter ..... .70

5306. **PLATE—Fused Silica, American make,** nontransparent; will withstand rapid and extreme changes of temperature without cracking. Used in some laboratories as a substitute for wire gauze. Thickness ⅛ inch.

Size, inches	3x3	4x4	6x6	9x9	12x12
Each	.27	.48	1.08	2.43	4.32

5307. **Ditto—Vitreosil** ..... .50 .88 1.98 4.45 7.92

5308. **PLATE—Fused Silica, American make,** similar to No. 5306, but ¼" thick.

Size, inches	3x3	4x4	6x6	9x9	12x12
Each	.54	.96	2.16	4.86	8.64

5309. **Ditto—Vitreosil** ..... .99 1.76 3.96 8.91 15.84

PLATE—Fused Silica, transparent, see **Quartz.**

5311. **PLATE—Streak,** unglazed, as used for arsenic tests and by mineralogists.

Length, mm.	70	85	90	140
Width, mm.	40	60	65	90
Each	.24	.38	.42	.60

5312. **PLATE—Porous,** dinner plate size and shape; for quickly drying crystals, etc.....**each** .20
dozen 2.00

PLATE—Asphalt Flow, see Nos. 194 & 196.

PLATE—Cork, see No. 2290.

PLATE—Crusher, see Nos. 2414 & 2416.

PLATE—Electric Hot, see **Hot Plates.**

PLATE—Zinc and Carbon, see **Batteries.**

Platinum

Our Platinum Ware is of the highest quality.
All dishes and crucibles are hammered—not spun.
Vessels of special shape or size, not listed, made to order at short notice.
We purchase old or scrap platinum, allowing the highest market price.
All weights quoted are approximate only.
Prices depend on the market price of Platinum.
Prices on quotations and prices on invoices are strictly net cash. No discount applies.

5320

5322

5320. **PLATINUM—Boat, for combustions,** width about ⅜ inch.

Length, inches	1½	2	2½	3
Weight about, grams	5	6	7.5	9.5

5322. **PLATINUM—Capsule, for blowpiping,** with handle; outside diameter 1¼ inches, inside 1 inch. Weight about 5 grams.

5324

5328

5334

5324. **PLATINUM—Cone, for filtering** with suction; angle 60°, seamless and profusely perforated.

Diameter at top, inches	¾	⅞	1	1⅛	1¼	1½	1¾	2
Weight about, grams	1.8	2.0	2.8	3.5	4.0	6.0	8.5	11.5

5326. **Cone of Steel**—with wooden mould, for shaping cones made of platinum foil to the correct angle **4.00**

5328. **PLATINUM—Crucible,** with covers, best hammered.

Capacity, cc.	10	15	20	25	30	40	50	60	75
Weight about, grams	10	15	20	25	30	40	50	60	75

5330. **Ditto—Wide shape,** with cover. Capacity 12 cc. Weight about 12 grams; other sizes made to order.

5332. **PLATINUM—Crucible Case,** of polished wood, for No. 5328 crucibles.

For crucible, cc.	10	15	20	25	30
Each	**1.00**	**1.10**	**1.20**	**1.25**	**1.35**

5334. **PLATINUM—Crucible, Gooch form,** with perforated bottom, cover and cap for bottom.

Capacity, cc.	15	20	25	30
Weight about, grams	20	25	30	35

5336. **PLATINUM—Crucible combustion,** Shimer, price and particulars on application.

5340

5338

5342

5338. **PLATINUM—Crucible, J. Lawrence Smith,** for mineral analysis, see Bulletin No. 305, p. 145, U. S. Geological Survey. Length about 3¼ inches, diameter ¾ inch; weight including cover about 28 grams.

5340. **PLATINUM—Dish, Evaporating,** with spout, best hammered. Of regular shape and weight. Dishes of lighter weight made to order.

Capacity, cc.	20	30	45	80	125	200	270	370	400
Weight about, grams	8	14	22	32	48	65	90	125	150

5342. **PLATINUM—Dish, for iron analysis,** with flat bottom, straight sides and wire rim.

No.	1	2	3
Diameter, mm.	90	100	110
Depth, mm.	50	55	58
Weight about, grams	80	100	125

5344

5346

5348

5344. **PLATINUM—Dish, for incineration.**

Size,	1½x1½	1½x2	2x2
Weight about, grams	12	15	22

5346. **PLATINUM—Dish, for milk analysis,** with or without lip and handle.

Diameter about, inches	2	2¾
Depth, inches	⅝	½
Weight about, grams	13 to 15	18 to 20

5348. **PLATINUM—Dish, for sugar analysis,** without handle; diameter about 2 inches, depth 1 inch, capacity 45 cc., weight about 20 grams.

5350. **Ditto**—With handle; diameter about 1¾ inches, depth ¾ inch, capacity 30 cc., weight about 15 grams.

5352

5352. **PLATINUM—Dish, for water analysis,** shallow; diameter about 3¼ inches, depth ¾ inch, capacity 100 cc., weight about 25 grams.

5354 5356 5360 5362 5364

5354. **PLATINUM—Electrodes, Cone and Spiral,** rivetted or soldered. Weight of cone about 25 grams; weight of spiral about 16 grams.

5356. **PLATINUM—Electrodes, Cylinder and Spiral,** cylinder 2 inches high, 1 inch diameter, rivetted or soldered. Weight of cylinder about 15 grams; weight of spiral about 10 grams.

5358. **PLATINUM—Electrodes, Cylinders,** set of two, 2x¾ inches and 2x1 inch, rivetted or soldered. Weight about 10 and 15 grams respectively.

5360. **PLATINUM—Electrode, Cylinder, of gauze,** 2 inches high, 1 inch diameter; weight about 14 grams.

Other sizes and shapes to order.

5362. **PLATINUM—Electrodes, gauze Cathode, and platinum wire frame Anode, Hollard.** With this form, bubbles on the surface are prevented; the deposition is rapid and the deposit adheres firmly. Weight complete, about 40 grams.

5364. **PLATINUM—Electrode, Plate with rod, Classen,** diameter 2⅜ inches.

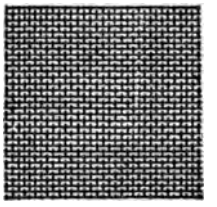
5366. **PLATINUM—Electrode, Dish, Classen,** diameter 3½ inches, polished or roughened inside as desired; weight about 30 grams.

5368 5370

5368. **PLATINUM—Filter Boat, Blair, for iron analysis,** etc. Size of boat 2⅜x⅜ inches; weight of boat and holder about 23 grams; weight of boat only, about 8 grams.

5370. **PLATINUM—Filter Boat Holder, of rubber, in which to set above holder** **2.00**

PLATINUM—Forceps, see Forceps.



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5382

5372. **PLATINUM—Foil.** All thicknesses from 2/1000th inch up to plates—the same price per gram.

For blowpipe purposes, foil 2/1000th inch and 3/1000th inch, weight per square inch 0.75 gram, and 1.0 gram respectively are generally used.

5374. **PLATINUM—Foil, thin,** for battery purposes, 1/1000th inch thick; weight per square inch, about 0.5 gram.

5376. **PLATINUM—Foil, extra thin tissue,** 1/2000th inch thick; weight per square inch, about 0.25 gram.

5378. **PLATINUM—Gauze.** Not less than the full width of 4 inches sold.
Size, 60 mesh, weight per square inch, about 0.740 gram.
Size, 40 mesh, weight per square inch, about 1.5 grams.

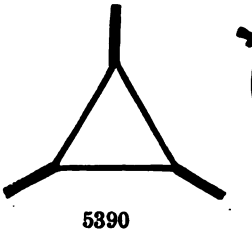
5380. **PLATINUM—Muffle,** of any size and weight—to order.

5382. **PLATINUM—Spatula.**

Length, inches	3	4	5	6
Weight about, grams	7	10	12	15

5384

5388



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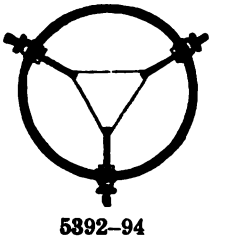

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5384. **PLATINUM—Spoon.**

Diameter, inches	⅜	½	⅝	¾
Weight about, grams	1.5	2.5	4	8

5386. **PLATINUM—Stirrer,** hollow, seamless, one end pointed, the other round; diameter ⅛ inch.

Length, inches	3	4	5	6
Weight about, grams	4.5	5.5	7.5	8.5

5388. **PLATINUM—Tips,** for blowpipes; solid, with small uniform hole

5390. **PLATINUM—Triangle,** of platinum iridium wire with ends twisted. Made of No. 15 wire.

For crucibles, cc.	10	15	20	25	30	40
Weight about, grams	.11	11.5	12	12.5	13	15

5392. **PLATINUM—Triangles,** for use with holders; Nos. 5394–5400. Made of No. 18 wire.

Length of side, inches	1¾	2⅜	3¾
Weight about, grams	5	8	10

5396 5400 5398

5394. **PLATINUM—Triangle Holder,** for placing on tripod; with adjustable arms for holding triangles firmly and in place; without triangle **1.75**

5396. **Ditto**—With fastener to affix to support **2.00**

5398. **PLATINUM—Triangle Holder,** Improved, with wooden handle; adjustable and inclinable; without triangle **2.50**

5400. **PLATINUM—Triangle Holder,** with adjustable arms and arrangement for holding over Bunsen burner **4.00**

5402

5402. **PLATINUM—Tube, for combustion,** seamless; fitted with nickel silver tubulated stopper ground in; narrow extension tubes of each size, about 6 inches long, 3/16 inch diameter.

Length of body, inches	12	18	12	18	20
Diameter, inches	5/8	5/8	7/8	7/8	1
Weight about, grams	125	175	150	220	385

Nickel silver fittings extra.

5404. **PLATINUM—Wire.** All sizes up to No. 27 the same prices per gram, for blowpipe purposes, Nos. 25 to 27 are generally used.

5406. **PLATINUM—Wire** No. 32 and No. 35, for suspending Westphal balance plummets.

5408. **PLATINUM—Wire, Hair** 4/1000th inch diameter, for calorimeter ignition wire; sold only on 1 gram spools.

5410. **Ditto**—2/1000th inch diameter; sold only on 1 gram spools.

5412. **Ditto**—1/1000th inch diameter; sold only on 1 gram spools.

5414. **Ditto**—2/10000th inch diameter, the thinnest made; silver coated, as used for wireless telegraphy.

5416. **PLATINUM—Spongy.**

5418. **PLATINUM—Black.**

5422 5424 5426 5428 5432 5434 5438

5422. **PLIER—Flat nose,** steel faced.

Size, inches	4	5	6
Each	.90	1.00	1.10

5424. **PLIER—Flat nose, side cutting,** steel faced.

Size, inches	4	5	6
Each	1.35	1.45	1.60

5426. **PLIER—Side cutting.**

Size, inches	4	5	6
Each	1.60	1.80	2.00

5428. **PLIER—End cutting.**

Size, inches	4	5	6
Each	1.35	1.45	1.60

5432. **PLIER—Button, straight,** for lifting cupel beads 1.35

5434. **PLIER—Button, turned down nose,** for holding buttons while brushing 2.25

5438. **PLIER—Gas,** length 8 inches 1.00

PNEUMATIC TROUGHS—See Troughs.

5439

5439/1–5439/2

5439. **POLISHING HEAD—For Belt Drive,** equipped with ½ inch steel spindle, 10 inches long, provided with a taper screw on one end and a three-jawed chuck, capacity 0 to ¼ inch, on the other. It also has flanges for holding a wheel ¾ inch thick. The pulley is 2¼ inches in diameter and will take either ¼ inch round or ¾ inch flat belt. Packed in box 10¾x7½x3½ inches 7.00

5439/1. **POLISHING HEAD—Electric,** with ⅛ H. P. universal motor for 110 volts and three speed rheostat in base, giving 2000, 6000, and 8000 R. P. M. With eight feet of cord and attachment plug, equipped as illustrated 45.00

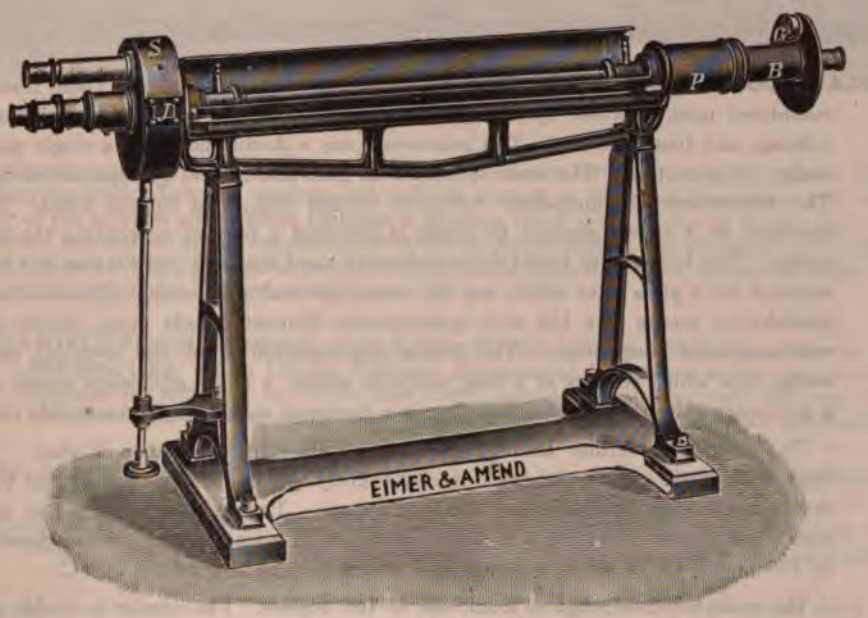
5439/2. Ditto—for 220 volts 45.00

POLISHING MACHINES—for **metallurgical purposes,** see Nos. 4387–4387/8.

Polariscopes

Our machine shop repairs polariscopes of all makes when the optical parts are not broken. At time of going to press there are no instruments in stock, so that we cannot indicate prices. However, we hope to have a supply of polariscopes by the time the catalog is ready for distribution. The following descriptions, except Nos. 5445 and 5481, are copied from our former Catalog C, omitting prices, and give an idea of the different types. In case you need a Polariscope, write to us, stating in detail your requirements. We will then advise you what instruments are available.

Please note that we carry in stock a full assortment of highest grade Polariscope Tubes, which are made in our own instrument shops.



5442–44

The following instruments for use with white light with wedge compensation—Ventzke scale (especially for sugar analysis) can also be used for other work, by using a factor to arrive at the degree of rotation. All the wedge instruments are equipped with cell for dichromate solution.

5440. POLARISCOPE—half shadow, with single wedge compensation; for tubes up to 200 mm. long. Best construction, with arrangement for reading scales, dust protection cap for analyzer; complete on tripod base stand, including one each 100 mm. and 200 mm. tubes; in mahogany case ..... **price on application**

5442. Ditto—on trestle support, with folding glass case ..... **price on application**

5444. POLARISCOPE—Similar to 5442, but for tubes up to 400 mm. long; including one each 100 mm., 200 mm. and 400 mm. tubes ..... **price on application**

5445

5445. **POLARISCOPE—Saccharimeter, B. & L.,** represents in all of its details those features considered most desirable by a majority of chemists in the beet sugar, cane sugar, refining, and food interests. The polariscope has a double field and a single quartz wedge compensation. The scale is etched on glass and is read by transmitted light. The instrument accommodates tubes up to 400 mm., also control tubes. It is mounted on a trestle support to which is attached a bracket supporting the light source. The bichromate liquid filter ordinarily used for light purification has been replaced by a glass filter which has the same spectral properties. Illumination is provided by means of a 100 watt, concentrated filament Mazda lamp, placed in a well ventilated lamp house. The quartz compensation is of the so-called single wedge type which consists of a long movable wedge, a short stationary wedge and a stationary plate, all mounted together in a dustproof can having a removable cover.

The scale and vernier are engraved on closely adjacent plates of glass. The ends of the scale and vernier lines overlap slightly. In this way estimations of 0.025 degree sugar may be easily and accurately made. The scale is calibrated so as to read sugar degrees based on a standard weight of 26 grams of pure sucrose dissolved in 100 metric cc. of water, solution and polarization to be made at 20° C.

The scale covers a range of from −30 to 100 degrees. The vernier is double providing for both positive and negative readings.

Illumination of the scale is obtained by means of two reflecting prisms. The analyzer is a Glan Thompson prism. The observation telescope and the scale reading microscope are focused with a spiral motion.

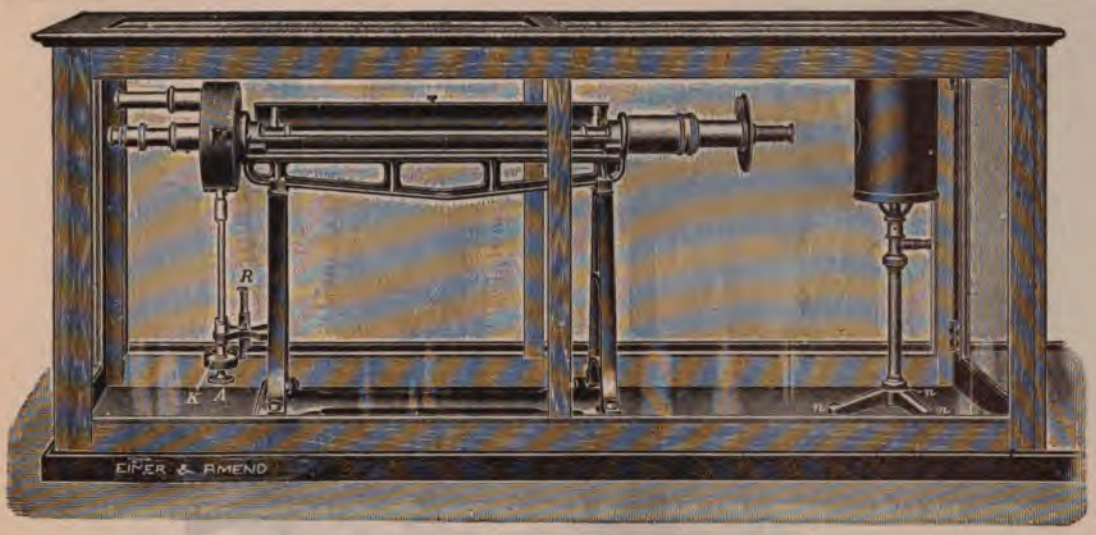
Three sugar tubes one each 100, 200, and 400 cc. are supplied with the outfit, also an adjusting screw and a threaded tube for removal of polarizer and analyzer mounts **710.00**

5446. **POLARISCOPE—triple field of vision, with single wedge compensation; for tubes up to 200 mm. long.** Best construction, with arrangement for reading scales, dust protection cap for analyzer; complete on tripod base stand, including one each 100 mm. and 200 mm. tubes; in mahogany case .....**price on application**

Cut similar to No. 5442.

5448. **Ditto**—on trestle support, with folding glass case .....**price on application**

5450. **POLARISCOPE**—Similar to No. 5448, but for tubes up to 400 mm. long; including one each 100 mm., 200 mm. and 400 mm. tubes .....**price on application**



5454–61

The following instruments, with double wedge compensation with two movable quartz wedges, and the accompanying scale, allow the analyst, not only to control in the most convenient and precise way the accuracy of the scale in all its parts (without a separate check plate of quartz, having but a single unalterable value), but also to verify the rotary effect thrice determined in the ordinary way. Besides this, the apparatus allows a left polarization over the whole scale from 0–100, an advantage which cannot be underrated in the use of the immersion methods.

5452. **POLARISCOPE—Half shadow, with double wedge compensation; for tubes up to 200 mm. long.** With Lippich Polarizer, arrangement for reading scales, dust protection cap for analyzer, on tripod base stand; complete with one each 100 mm. and 200 mm. tubes, in mahogany case; without lamp .....**price on application**

5454. **Ditto**—on trestle support, with folding glass case .....**price on application**

5456. **POLARISCOPE**—Similar to No. 5454, but for tubes up to 400 mm. long; including one each 100 mm., 200 mm., and 400 mm. tubes, without lamp..**price on application**

5462

5458. **POLARISCOPE—triple field of vision, with double wedge compensation; for tubes up to 200 mm. long.** With Lippich Polarizer, arrangement for reading scales, dust protection cap for analyzer; complete on tripod base stand, and one each 100 mm. and 200 mm. tubes; in mahogany case
price on application

5460. **POLARISCOPE**—Same as No. 5458 but on trestle support, with folding glass case
price on application

5461. **Ditto—For tubes up to 400 mm. long** ....**price on application**

5462. **Arrangement**—for reading temperature of wedges
price on applica

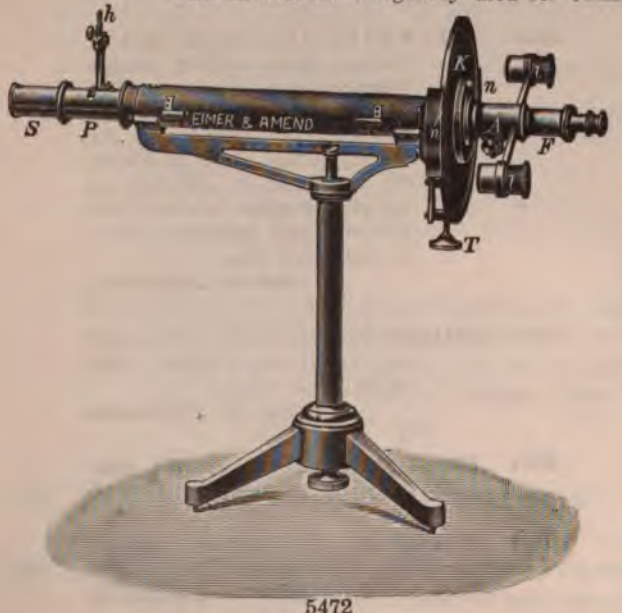
5468–70

Polariscopes for general chemical work, reading in degrees of rotation. The instruments with additional scale for reading direct percentage of sugar without calculation, make them very desirable.

5468. **POLARISCOPE—for urine analysis.** This instrument is adapted for the rapid and exact estimation of glucose and albumin in urine, reading to 0.1%, using ordinary white light; complete with one each 50 mm., 100 mm. and 200 mm. observation tubes, in mahogany case ..... **price on application**

5469. **POLARISCOPE—Mitscherlich Simple form,** for school demonstration; for use with monochromatic flame produced by sodium lamp; with one 200 mm. tube, in mahogany case ..... **price on application**

5470. **POLARISCOPE—Mitscherlich Half Shadow,** with Laurent Polarizer, reading to 1/10 degree; on tripod base support, one each 94.7 mm. and 189.4 mm. observation tubes, with sodium gas lamp; complete in case ..... **price on application**
This instrument is regularly used for Urinary Analysis, etc.

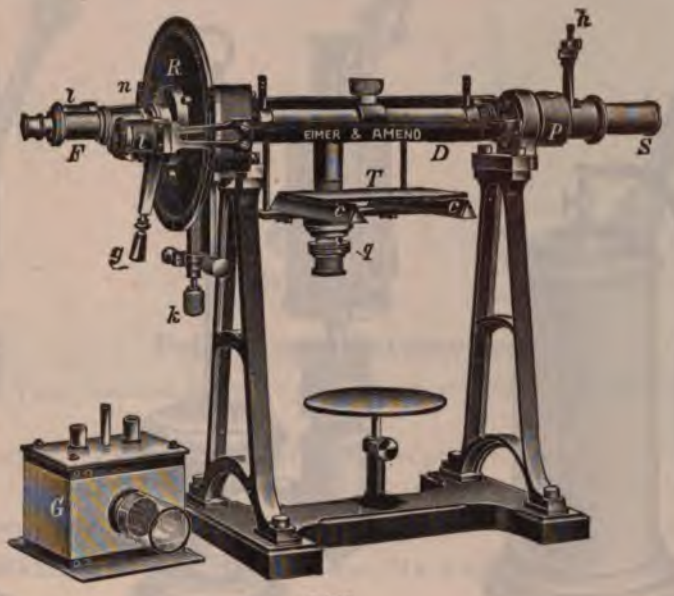


5472

5472. **POLARISCOPE—Lippich, Half Shadow, for tubes up to 220 mm. long.** With absorption vessel, double field polarizer, reading on circle to 0.01 degree; on tripod base support, with one each 100 mm., 200 mm. and 220 mm. tubes, and sodium gas lamp; complete in case **price on application**

5476. **POLARISCOPE** — Similar to No. 5472, but for tubes up to 400 mm. On trestle support, with folding glass case, and one each 100 mm., 200 mm., 220 mm. and 400 mm. tubes **price on application**

Additional direct percentage of sugar scales for Nos. 5472 and 5476. **price on application**

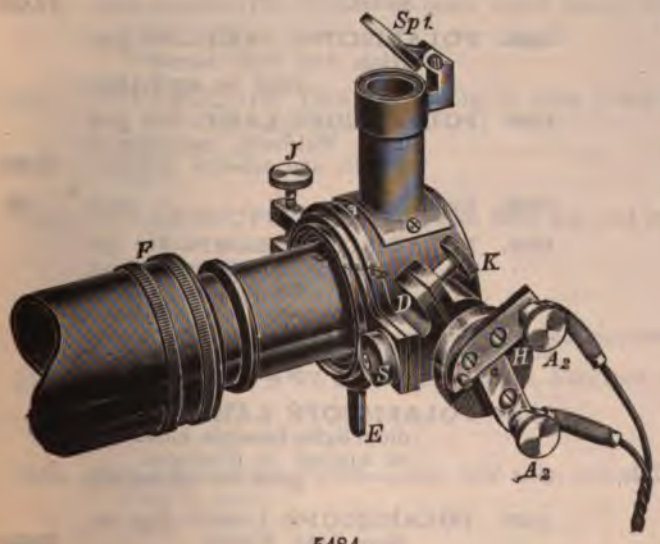


5480

5480. POLARISCOPE—Landolt, for tubes up to 220 mm. long. With Lippich triple field Polarizer, reading to 0.01 degree, heating apparatus "G," table plate "T," support "D" for tubes, on trestle support; complete with folding glass case, and one each 100 mm., 200 mm. and 220 mm. tubes ..... **price on application**

Landolt improved Sodium Gas Lamp No. 5504 is recommended for use with this instrument.

5481. POLARISCOPE—Simple form, especially adapted for the examination of crystals, polarizing prisms, quartz and spar plates, etc., and is especially convenient for the study of rotation by optically active liquids. The polarizer consists of a plate glass and a plane mirror in front same as in the standard Noerrenberg polariscope. It can be tilted and clamped in any position, from parallel to the axis of the instrument to perpendicular to it. The analyzer is held in rotating collar, the position of which is read on a circle divided to 5 degrees. Three analyzers are provided: a Nicol prism, a black glass mirror and a pile of glass plates **100.00**



5484

Accessories

5481a. **Tourmaline Tongs** ... **5.00**

5481b. **Wollaston Prism**—aperture 19–20 mm. square **23.00**

5481c. **Quartz Plate**—cut perpendicular to the axis, 20 mm. square face 5 mm. thick.. **10.50**

5484. **ELECTRIC ILLUMINATING APPARATUS — for Polariscopes,** with special Osram Lamp encased, and mirror reflecting arrangement for illuminating scale **price on application**

5484a. **Extra Osram Lamps** **price on application**

5484b. **Set of 3 accumulators**—in case, with switch **price on application**

5486

5490

5492

Polariscope Lamps

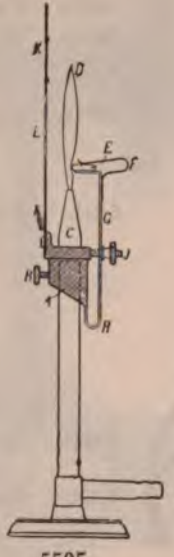
5486. **POLARISCOPE LAMP—for acetylene gas,** on adjustable stand; with asbestos cylinder and acetylene generator ..... **price on application**

5488. **Ditto**—without generator ..... **price on application**

5490. **POLARISCOPE LAMP—For alcohol,** with incandescent mantle; on stand, with reservoir as illustrated ..... **price on application**

5492. **POLARISCOPE LAMP—For kerosene,** with duplex burner, and asbestos cylinder... **18.00**

5504



5505

5494. **POLARISCOPE LAMP—Electric,** with frosted bulb for 110 or 220 volts, asbestos cylinder, on adjustable stand; with cord and socket **27.00**

5496. **POLARISCOPE LAMP—For gas, Hink,** with triple burner **price on application**

5498. **POLARISCOPE LAMP—For gas,** with Welsbach incandescent mantle, and asbestos cylinder. **18.00**

5498a. **Extra mantles** ..... **each** **.50**

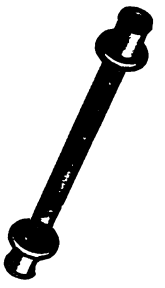
5500. **POLARISCOPE LAMP—For sodium light,** on adjustable stand, with asbestos cylinder **price on application**

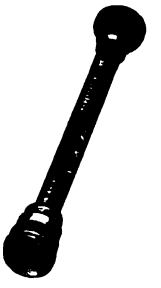
5502 **Ditto**—with more intense flame **price on application**

5504. **POLARISCOPE LAMP—For sodium light, Landolt,** improved; on support, as illustrated **price on application**

5505. **POLARISCOPE LAMP—For sodium light, Eppley** **30.00**

5514


5516


5524

Polariscope Accessories

The Polariscope Tubes described below are made in our own shops and are of the best quality and workmanship.

5506. **POLARISCOPE TUBE COVER GLASSES**—Optically inactive, 15.5 mm. diameter ..... dozen **3.50**

5508. **Ditto**—23 mm. diameter ..... dozen **4.00**

5510. **RUBBER WASHERS**—For Observation tubes, 14.5 mm. diameter ..... dozen **.25**

5512. **Ditto**—23 mm. diameter ..... dozen **.40**

5514. **POLARISCOPE TUBE**—of glass, with screw caps. Caps fitted with sealing wax.

Length, mm.	100	200	400
Each	**4.50**	**4.50**	**5.00**

5515. **Ditto—Special**; caps fitted with litharge and glycerine **5.25** **5.25** **5.75**

5516. **POLARISCOPE TUBE—Landolt**, with sliding caps, which are instantly adjusted. Caps fitted with sealing wax.

Length, mm.	100	200	400
Each	**7.00**	**7.00**	**7.50**

5517. **Ditto—Special**, caps fitted with litharge and glycerine **7.75** **7.75** **8.25**

5518. **POLARISCOPE TUBE**—Glass tube only, unmounted.

Length, mm.	100	200	400
Each	**1.25**	**1.25**	**1.50**

5520. **POLARISCOPE TUBE**—of brass, nickel plated, with screw caps.

Length, mm.	100	200	400
Each	**6.00**	**6.00**	**6.50**

5522. **POLARISCOPE TUBE—Landolt**, of brass, nickel plated, with sliding caps; which are instantly adjusted.

Length, mm.	100	200	400
Each	**8.50**	**8.50**	**9.00**

5524. **POLARISCOPE TUBE—of glass, with one end enlarged**, to receive the air bubbles; with screw caps.

Length, mm.	100	200	400
Each	**5.00**	**5.00**	**5.50**

5525. **Ditto—Special**, caps fitted with litharge and glycerine **5.75** **5.75** **6.25**

5527. **POLARISCOPE TUBE**—Similar to No. 5524, but of **Brass Nickel Plated.**

Length, mm.	100	200	400
Each	**6.50**	**6.50**	**7.00**

5528. **POLARISCOPE TUBE—glass tube only**, unmounted.

Length, mm.	100	200
Each	**1.75**	

5530

5534

5538

5530. **POLARISCOPE TUBE—Inversion, of glass,** tubulated in center for thermometer; with screw caps.

Length, mm.	100	200	400
Each	**5.50**	**5.50**	**6.00**

5531. **Ditto—Special,** caps fitted with litharge and glycerine **6.25** **6.25** **6.75**

5532. **POLARISCOPE TUBE—glass tube only,** unmounted.

Length, mm.	100	200	400
Each	**2.25**	**2.25**	**2.75**

5534. **POLARISCOPE TUBE—Pellet, of brass,** nickel plated; with inlet and outlet tubes for continuous flow; with screw caps.

Length, mm.	100	200	400
Each	**15.00**	**15.50**	**16.00**

5536. **Ditto—with funnel connection.**

Length, mm.	100	200	400
Each	**18.50**	**19.00**	**19.50**

5538. **POLARISCOPE TUBE—Inversion, Landolt,** of glass, with nickel plated brass jacket for water circulation, and tubulature for thermometer.

Length, mm.	100	200	400
Each	**15.00**	**15.50**	**16.00**

5542. **THERMOMETER**—0–42 degrees C. in 1/10 degrees, for use with above **4.50**

5552

5546. **QUARTZ TESTING PLATE**—Normal, optically true; in nickel plated brass mountings
price on application

POROUS CUPS—See No. 2484.

5552. **POT—Acid,** of stoneware, cylindrical.

Capacity, gallons	5	7½	10
Each	**6.00**	**7.00**	**9.00**

5554. **Ditto—Conical,** same prices as above.

5556

5556. **POT—Acid,** of stoneware, with or without outlet near the bottom.

Capacity, gallons	14	20	30	40	55	80	110
Each	**18.00**	**25.00**	**26.00**	**35.00**	**45.00**	**80.00**	**90.00**

5558. **Ditto—with stopcock ground in outlet** **24.50** **31.50** **32.50** **41.50** **52.00** **87.00** **100.00**

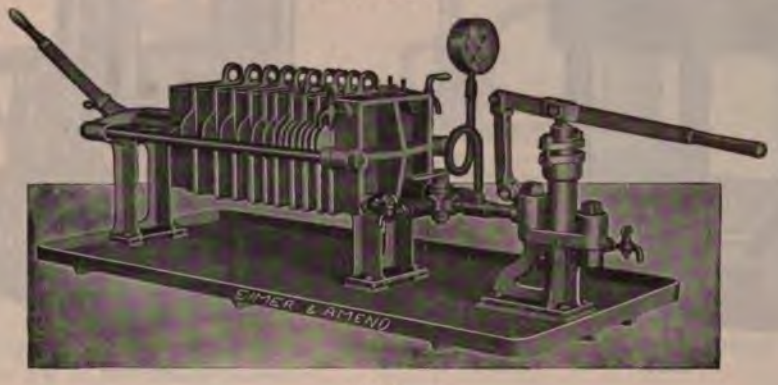
POLISHING HEADS—See Nos. 5839 and 5839/1.

POLISHING MACHINES—for metallurgical purposes, see Nos. 4387–4387/8.

POTASH BULBS—See Bulbs.

PRECIPITATING JARS—See No. 4150.

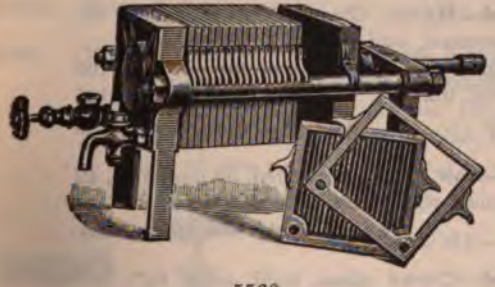
Presses



5559

5559. PRESS—Filter, Experimental Laboratory, designed for determining accurately the properties of materials to be filtered, also used for practical work on a small scale. The press is of the four-eyed, closed delivery washing type, complete with hand pump, valves, pressure gauge and drip pan. It will withstand a pressure of 250 lbs. to the square inch. It is provided with ½, 1, 1½, and 2 inch frames, each frame having a filtering area of 72 inches. The press made of iron is supplied, unless bronze is specified. Blue print and full directions go with each press **110.00**

5559a. Set of Filter Cloths .....**extra** **1.50**



5560

5572

5580

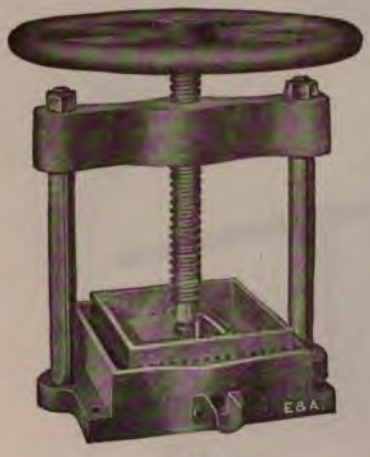
5560. PRESS—Filter, E. & A., working by gravity; specially designed for filtering large quantities of liquid, containing only a small amount of sediment. It is so arranged that only one compartment, having a filtering area of 32 square inches, or any number up to its full filtering capacity of 2½ square feet may be used **105.00**

5560a. Set of Filter Cloths and Papers .....**extra** **4.25**

5572. PRESS—Pastille, Hempel, for preparing pellets or pastilles for calorimetric work, etc.... **30.00**

5580. PRESS—Tincture.

Capacity, gallons	¼	½	1	2
Each	14.50	16.00	19.00	24.00



5583

5585

5583. **PRESS—Cosette.** Most substantially constructed to resist extreme pressure **110.00**

5585. **PRESS—Hydraulic,** for making compression tests on blocks of concrete or other material; for Bacteria work; for bending, straightening, etc. Ideal for small work requiring high pressure. The handle will operate the pump easily where only small pressure is required, and by applying an extension lever, a pressure of 30 tons may be developed. Dimensions of base 12x16″, Height 27″, Capacity 30 tons. Size of plates 8″x8″. Stroke of ram 4″. Diameter of ram 3½″. Maximum opening 8″. Approximate weight 425 lbs. **300.00**

5588 5590 5592

5588. **PRISM—Indigo,** hollow; heavy polished glass
price on application

5590. **PRISM—Mirror Glass,** stoppered; sides cemented, acid and alkali resisting.

Height, mm.	75	90	105
Width, mm.	35	60	105

Each .....**prices on application**

5592. **Ditto—Low shape,** stoppered, 50 mm. high, 42 mm. wide; transparent centres.
price on application

5594. **PRISM—Crown glass,** solid, angle 60°.

Length, inches	4	6	8

Each .....**prices on application**

5596

5596. **PRISM—Trough shape,** with cover; each partition 50 mm. long, 55 mm. side.

Compartments	1	2	3	4

Each .....**prices on application**

5598. **PRISM**—wedge shape; set of two.

Height, mm.	40	45	50
Length, mm.	100	140	180

Each .....**prices on application**

5604

5606

5608

5609

5604. **PUMP—Acid,** simple and convenient; for use with bottles and carboys, having necks from 1¾ to 2⅝ inches diameter **10.00**

5604a. **Rubber Stopper**—for above **2.25**

5606. **PUMP—Acid, E. & A.** The liquid is delivered quickly, and in a constant stream which can be instantly checked. The rubber stopper fits any regular carboy; with glass tube **8.00**

5606a. **Rubber Stopper**—for above **1.50**

5606b. **Footblower**—No. 9 to operate pump ..... **extra,** see No. 762

5606c. **Glass Tube**—for 5606 ..... **.75**

5608. **PUMP—Acid, Matthew,** patented, complete with air pump as illustrated **30.00**

5608a. **Glass Tube** for above **3.50**

5609. **PUMP—Rotary,** for transferring liquids from barrels, carboys, etc. Suitable for handling chemical solutions, oils, liquid glues, etc., not suitable for gritty liquids. Capacity 13 gallons per minute at 100 R. P. M. Diam. of hose 1 inch. Total weight 44 lbs. Furnished complete with adjustable Bung Holder, tank hook and hose coupling of iron **25.00**

5610

5612

5609/1. **PUMP**—as above of bronze for corrosive liquids **85.00**

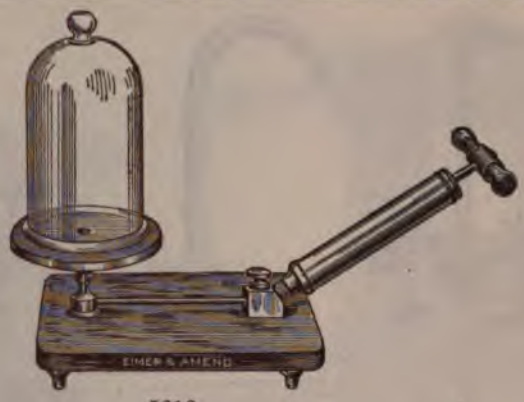
5609a. **Rubber Hose**—three ply for above pumps. Per foot ..... **.50**

5609b. **Adjustable Threaded Bung Holder**—for use with above **2.75**

5610. **PUMP—Air,** to exhaust or condense; barrel 8 x 1¾ inches **10.50**

5612. **PUMP—Air,** with two stopcocks for exhausting and transferring **15.00**

5614



5616

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5620

5614. **PUMP—Air,** with patented valve increasing the efficiency. On oak base, coupling with nipple attachment. Height 21½ inches, barrel 16x2⅛ inches **11.80**

5615. **Ditto**—with two valves and nipples; for vacuum and pressure **18.80**

5616. **PUMP—Air,** plate 6½ inches, mounted on polished mahogany base, with bell glass 1 quart capacity. Barrel 8x1½ inches; with stopcock, set screw and guard screw.... **35.00**

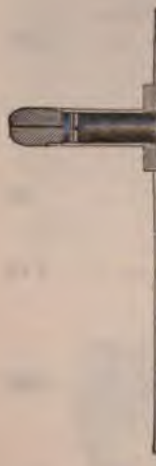
Vacuum Gauge—3 inches diameter .....**extra,** see No. 3708

5620. **PUMP—Air,** with polished mahogany base and pillar. Brass cylinder 8x2½ inches; plate 10 inches in diameter. The piston is packed in a manner to prevent leakage **90.00**

Vacuum Gauge—3 inches diameter .....**extra,** see No. 3708

5622. **PUMP—Plate,** on triangular base to connect with pump.

Diameter of plate, inches	8	10	12
Each	**14.00**	**17.50**	**21.00**



5624

5626

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5630

5624. **PUMP—Filter, Chapman form,** of brass, very powerful. These pumps produce a high vacuum very quickly.

Size	small	medium	large
Length, in..	3¾	4¾	5⅜
Thread, in..	⅛	¼	¼
Each	**1.50**	**1.80**	**2.00**

5626. **PUMP—Filter, Richard form,** of brass, very powerful.

Size	small	large	extra large
Length, in..	7	7	13
Thread, in..	⅛	⅜	¾
Each	**1.75**	**2.80**	**8.30**

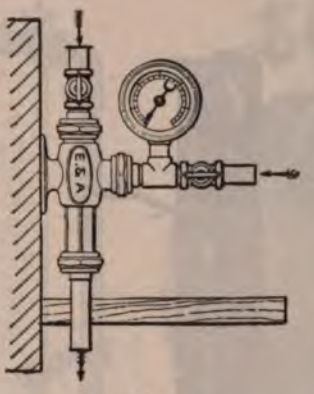
5628. **Filter Pump Coupling**—for threaded faucet ..... **.40**

5630. **Ditto**—for smooth faucet ..... **.60**

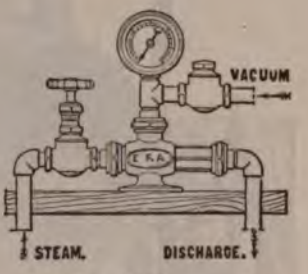
5631. **Filter Pump Coupling**—for threaded faucet for extra large Filter Pump No. 5626 ..... **.80**

When ordering, state for which size pump coupling is required.

5632



5640



5642

5632. **PUMP—Filter,** of brass; on base with vacuum gauge, and stopcocks **15.75**

5634. **Ditto**—without gauge **9.20**

5636. **Ditto**—without stopcocks, with gauge **13.25**

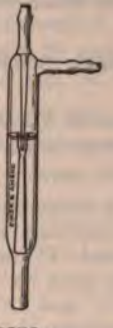
5638. **Ditto**—without stopcocks and gauge **6.60**

5640. **PUMP—Laboratory Water Jet Vacuum,** very efficient; for filtrations, distillations, etc. Capacity with 20 lbs. water pressure ⅓ cu. ft. displacement per minute of air at atmospheric pressure. A head of 15 ft. of water is sufficient. Complete with exhauster, vacuum gauge, connecting T and two stopcocks **25.00**

5642. **PUMP—Laboratory Steam Jet Vacuum,** same as above, but operated by steam, requiring a volume of steam equal to the evaporation of 12 lbs. water per hour. Complete with exhauster, vacuum gauge, connecting T, stop and check valve **25.00**

5644

5646



5650

5652

5654

5644. **PUMP—Filter, Geissler,** of glass **1.30**

5646. **Ditto**—with valve; mounted on board **5.00**

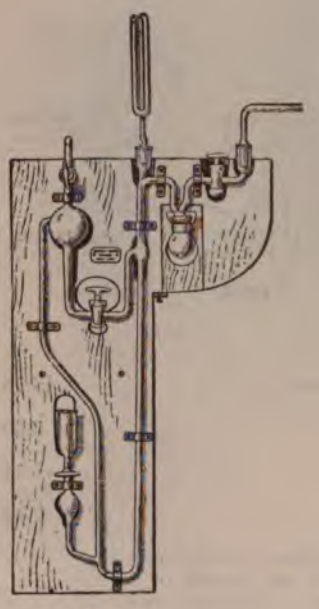
5648. **Glass Parts**—for above **2.00**

5650. **PUMP—Filter, Muencke,** of glass, with suction tube; very powerful **1.60**

5652. **Ditto**—with two suction tubes **1.90**

5654. **PUMP—Filter, Bunsen,** with mercury vacuum gauge; complete on support. This pump for small pressure of water works best with fall tube about 30 ft. long; with a fall tube 7 ft. long it will give only 5½ cm. of mercury **10.00**

5655. **Glass Parts**—for above **6.00**



5668

5669

5670/1

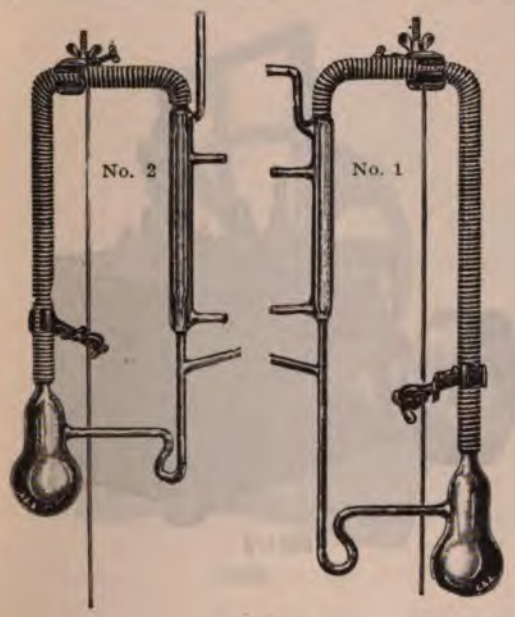
5668. **PUMP—Vacuum, Mercury, Boltwood,** with vacuum gauge, and drying chamber for P_2O_5; mounted on board, as illustrated..... **65.00**

This pump is simple and compact, and requires only 5 lbs. of mercury. It is operated by a small water aspirator (about 25 ft. water pressure being sufficient) which keeps the mercury in continuous action and carries off the exhausted air.

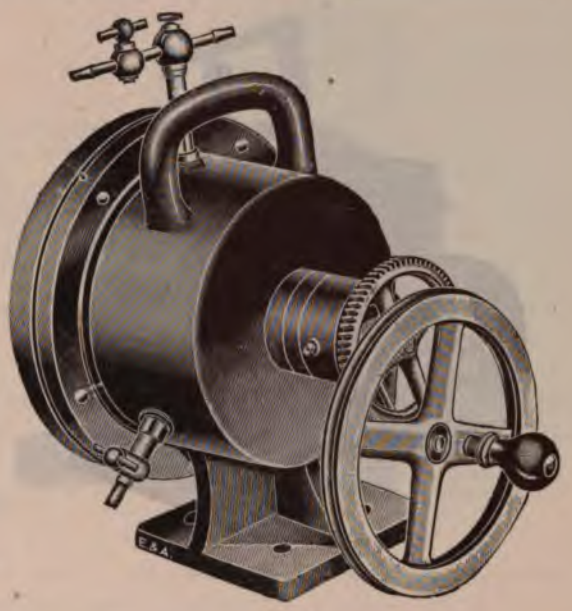
5669. **PUMP—Vacuum, Mercury, Sprengel,** mounted on support, with graduated scale **30.00**

5670/1. **PUMP—Vacuum, Mercury,** Bureau of Mines Model, according to Dr. G. A. Hulett. It is automatic. All connections with which the mercury comes in contact are of glass, thus avoiding contamination of mercury by rubber, or stopcock grease **120.00**

The vessel to be exhausted is connected to "a" and the mercury in the pump head "b" is allowed to fall below the juncture "e" by turning the stopcock "d," so that connection is made between "e" and "f" through "g." Air is thus drawn through "a" from the vessel into the pump head "b." The stopcock "d" is then turned so that connection is made between "d" and "b" through "h." Next, the stopcock "i" is turned so as to communicate between the outside air and the reservoir "f." Connection is made between "e" and a Chapman water pump, attached to a water faucet. The mercury rises in the pump head "b" and expels the trapped air through "m" and "e." The ground-glass float "j" is forced into the socket "k" when the mercury rises high enough. Hence the air cannot find its way back into the vessel that is being exhausted. At "l" is a flask containing phosphorus pentoxide for drying the air. At "m" is a barometric mercury column for showing the degree of exhaustion obtained in the apparatus. It is of such length that when the bulb "n" is compressed the mercury rises to the correct barometric height, and any movement of mercury in the pump head does not disturb the column if a complete vacuum has been obtained in the apparatus. At "o" is a column of granular calcium chloride. Another column of calcium chloride is attached to the glass-tube extension from "i" and communicates with the outside air. The mercury is raised and allowed to fall in "b" 13 or 14 times to exhaust completely a 300 cc. vessel. With each fall of the mercury the glass plug "j" drops out of the socket "k" and allows more air to enter "b" from the vessel.



5672



5680

5672 **PUMP—Vacuum, Mercury Vapor, Kraus.** For use with supporting pump (a water jet pump will do). The Kraus pump consists of two pumps, specially constructed of Pyrex glass, as shown in cut. Pump No. 1 operates against a back, pressure as high as 40 mm. and yields a vacuum below 1 mm. Pump No. 2 operates against back pressures as high as 7 or 8 mm., and produces a vacuum as high as is obtainable in pumps of this type. The nozzle of pump No. 2 is much larger than that of pump No. 1 and a smaller volume of mercury vapor suffices to carry on the process of evacuation. The boiling chambers have a diameter of about 5.6 cm. For the water jet pump, a nozzle having an interior diameter of 2 mm. and a delivery tube with inner diameter, 5 or 6 mm. is recommended. The water jet pump is started and when the pressure has fallen to about 25 mm. the burners are lighted. Dr. Kraus exhausted 1500 cc. to less than 10.4 mm. of mercury in about 10 minutes.

Pump as above described, consisting of the 2 glass pumps wrapped with asbestos cord, 1 metal stand with clamps, and Tirrill gas burner; without mercury, which will be supplied at market price **40.00**

a. **Glass Pump**—No. 1, low vacuum **20.00**
b. **Glass Pump**—No. 2, high vacuum **20.00**
c. **Metal support**—with clamps **2.90**

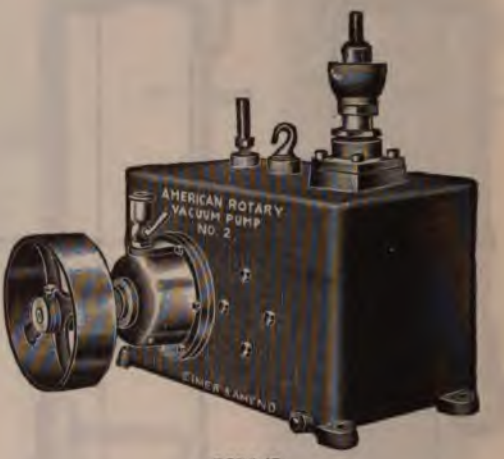
Tirrill Burner—see No. 1462.
Water jet pump—see No. 5626 large.

5680. **PUMP—Vacuum, Gaede,** for high vacuum. Preliminary exhaustion by regular mechanical pump recommended. The pump will evacuate a 6 liter vessel to 0.004 mm. in 5 minutes, to 0.0001 mm. in 10 minutes, and to 0.00001 in 15 minutes; without mercury ..... **price on application**

The pump consists of an iron vessel half filled with mercury (about 50 lbs.) in which an enameled steel bomb rotates. During the rotation, the chambers into which the drum is subdivided are filled alternately with air and mercury. These chambers at first suck the air from the receiver, and expel it during further rotation. The action is not unlike that of a gas meter, only that in the latter, the motion of the gas causes the rotation, whilst in this pump, the rotation is caused by external means and imparts motion to the gas.

Crowell Blower and Vacuum Pump—for both blast and vacuum, see **Blowers.**

5681



5681/2

5681. **PUMP—Vacuum, American Rotary, No. 1.**

These pumps are compact, operate with small expenditure of power, require no attention when in operation, are mechanically indestructible, are not affected by chemically active gases, are not endangered if the vacuum is broken. The pumps consist of a rotating piston, with steel blades, in an elliptically shaped case, which is immersed in oil and enclosed in an air tight case. The driving shaft has two stuffing boxes, which are oil sealed. One revolution of the No. 1 pump has a capacity of 27½ cubic inches. At 250 r. p. m. the capacity is 4 cu. ft. The No. 1 pumps are tested by a barometer gauge and must show a vacuum up to 1/50 of an inch. They are used especially for X-Ray tubes, nitrogen lamps, tungsten lamps, thermos bottles, rectifiers, and general laboratory and lecture work. Dimensions: height 15½", width 14½", length 16". Weight 113 lbs. Requirements: ½ H. P. 250 r. p. m., 2" belt **125.00**

5681/1. **PUMP—Vacuum, American Rotary No. 1½,** similar to above, but for higher vacua to 1/1000 inch, must be used in connection with a supporting pump, for example a No. 1 pump. A single No. 1 pump will serve for several of the No. 1½. Requirements ¼ H. P., 11 qts. vacuum pump oil. Other specifications similar to the No. 1 pump. Designed especially for exhausting the bulbs of tungsten filament lamps, also for vacuum furnaces, and for general use in scientific and mechanical laboratories.. **160.00**

5681/2. **PUMP—Vacuum, American Rotary, No. 2,** for high vacuum purposes, such as exhausting nitrogen lamp bulbs, vapor lamps, mercury arc rectifiers, X-Ray tubes, thermos bottles, etc. Reaches vacua to .000001 inch. Dimensions: 16" high, 18½" wide, 19" long. Weight 175 lbs. Requires ¼ H. P. Used with a supporting pump, for example, a No. 1. One No. 1 pump will serve several No. 2 ..... **230.00**

For **McLeod** and other gauges to use in connection with above pumps, see **Gauges.**

5682

5684–90

The Geryk Vacuum Pumps

These pumps are constructed on the hydraulic principle, by which the friction is reduced to a minimum. All working joints are oil sealed and self-adjusting; all valves are automatic, so that the air meets with no resistance whatever. The special oil used is carefully prepared for the purpose.

The pumps produce vacuum equal to the large Sprengel and other mercury pumps, but very much more quickly. They are always ready for use, and have no inside working parts to wear out.

5682. **PUMP—Vacuum, Geryk, No. 0,** vacuum obtainable within 0.3 mm. of mercury. With plate 7 inches diameter, cylinder 1½ inches diameter, stroke 5 inches, and vacuum gauge ..... **price on application**

5684. **Ditto—No. 1,** larger than No. 0 and exhausts more rapidly. Cylinder 2 inches diameter, stroke 5 inches without plate ..... **price on application**

5686. **PUMP**—similar to No. 5684, but fitted with plate, 8 inches diameter **price on application**

5694–96

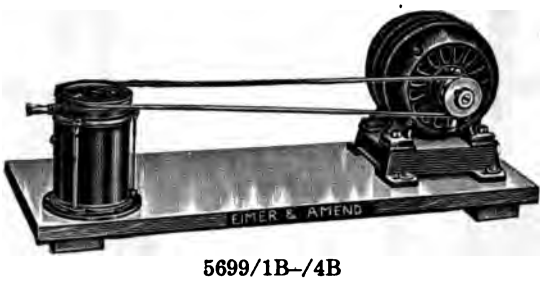
5688. **PUMP—Vacuum, Geryk No. 2,** cylinder 2 inches diameter, stroke 10 inches; without plate .. **price on application**

5690. **Ditto**—fitted with plate, 9 inches diameter **price on application**

5692. **PUMP—Vacuum, Geryk Duplex No. 1.** Especially designed for the rapid production of very high vacuum for exhausting X-ray tubes, etc. Cylinders 2 inches in diameter, stroke 5 inches **price on application**

5694. **Ditto—Duplex "A,"** for exacting laboratory requirements, and for continuous operation in factories; cylinders 2 inches diameter, stroke 5 inches **price on application**

5696. **Ditto—Duplex "B"** cylinders 2½ inches diameter, stroke 5 inches. **price on application**



5699/1B–/4B

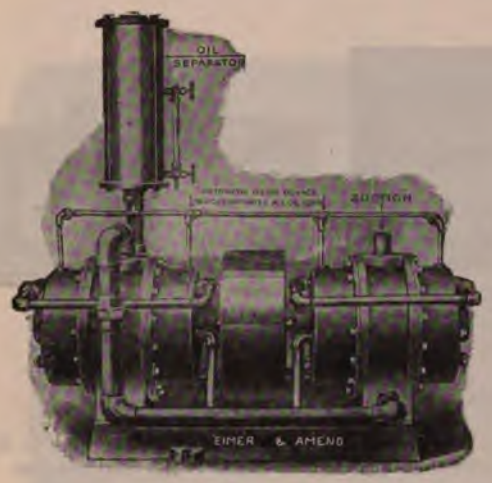
PUMP—Vacuum, Cenco Nelson, compact, operates on small power, requires no attention, measures about 5″ diameter by 7″ high, weighs about 10 lbs. The pump consists of three sets of rotating gears in pairs, one above the other, all being immersed in oil. There is a water cooling system for keeping down heat in obtaining high vacuum.

A constant speed ⅛ H. P. motor is recommended, shunt wound if D. C., induction if A. C. Under favorable conditions, a vacuum of 0.05 mm. is obtained. Displacement in free air approximately 285 cu. in. per min. or 10 cu. ft. per hour at a speed of 900 r. p. m. Will evacuate a flask of one liter capacity to a vacuum of 1 mm. in two minutes.

5697B.	Pump as above, unmounted, 3 stage	35.00
5698B.	" " " on hardwood base without motor, 3 stage	40.00
5699/1B.	" " " " " " with motor 110 V. A. C., 3 stage	83.00
5699/2B.	" " " " " " " " " " D. C., 3 stage	71.00
5699/3B.	" " " " " " " " 220 " A. C., 3 stage	85.00
5699/4B.	" " " " " " " " " " D. C., 3 stage	73.00

5699/10. **PUMP—Compound Vacuum,** will produce a vacuum within one-tenth inch of barometer; of large capacity; oil sealed; equipped with patented automatic oiling device which does away with all oil cups and insures perfect lubrication. Has no gears nor springs; operates quietly; recommended for heavy continuous work. For cut, see next page.

Size No.	Capacity Cu. Ft. P.M.	Speed R.P.M.	Outlet Inches	Weight Pounds	Horse Power	Pulleys Inches	Floor Space Required	Price
1	6	600	¾	175	¾	8 x 2	1 ft. 8 in. x 10 in.	275.00
2	9	600	¾	200	1	8 x 2	1 " 9 " x 10 "	423.50
3	15	600	¾	225	1½	8 x 2	2 " 0 " x 10 "	522.50
4	28	400	1	375	2½	10 x 3	2 " 8 " x 1 ft. 3 "	692.00
5	45	400	1¼	425	3	10 x 3	2 " 10 " x 1 " 3 "	987.50
6	63	250	1½	900	5	16 x 6	3 " 3 " x 1 " 9 "	1045.00
7	87	250	2	1100	5½	16 x 6	3 " 6 " x 1 " 9 "	1294.50
8	114	200	2½	1700	9	18 x 6	5 " 4 " x 2 " 2 "	1529.00
9	175	200	3	2300	13	18 x 6	7 " 0 " x 2 " 0 "	1881.00
10	263	200	6	3250	18	18 x 8	8 " 6 " x 2 " 0 "	2436.50



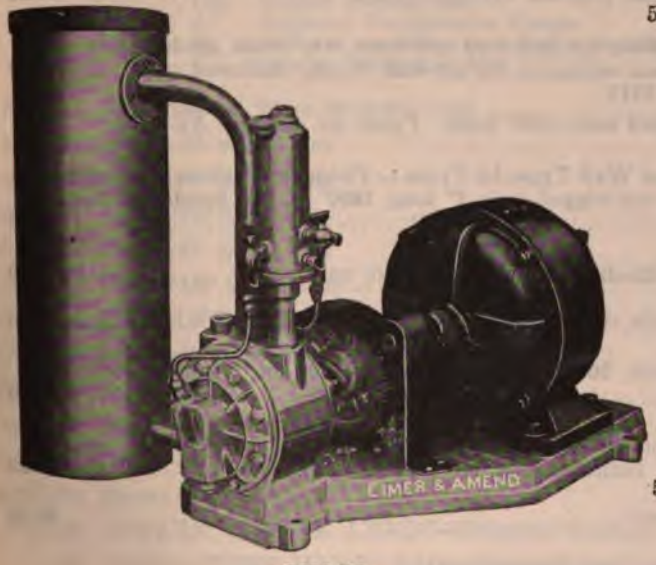
5699/10

5699/21

PUMP—Air Compressor, Laidlaw Vertical Feather Valve Type. Supplied with plain tight pulley for belt drive, with tight and loose pulleys for belting from line shaft, with floating idler pulley for short belt drive, or the compressor shaft may be direct coupled to shaft of electric motor. There are no springs nor buffer plates. Operation is noiseless. Frame is dust-proof with self-oiling bearings.

	Size inches	Displ. cu. ft. per min.	R.P.M.	B.H.P.		Pulley		Overall Dimen.	Pipe Sizes		Weight	Bare Price	Loose Pulley Price	Idler Price	Unloader Price
				100 lbs.	150 lbs.	Dia.	Face		Inlet	Outlet					
5699/21.	2½x3	5.2	600	1.2	1.5	12	2¼	12x12	¾	¾	110	**90.00**	**8.00**	**32.50**	.....
5699/22.	3½x4	12.2	550	2.5	3	16	3¼	16x16	1¼	1¼	200	**125.00**	**16.00**	**39.00**	**32.50**
5699/23.	4½x5	23	500	4.4	5.2	20	4½	20x20	1½	1½	375	**170.00**	**26.00**	**45.50**	**36.50**
5699/24.	6x6	44	450	8	9	24	5½	24x24	2	2	650	**275.00**	**32.50**	**58.50**	**39.00**

Above Ratings are maximum for intermittent service only. For very continuous, hard service, these machines should preferably operate at 75% of the maximum speed as listed above.



5699/31

5699/31. **PUMP—Vacuum and Pressure, Rotary No. 1.** For any dry vacuum purposes to within one-tenth inch of the barometer and adapted to pressure work up to twenty pounds.

Capacity 3½ cubic feet of free air per minute. Motor driven type with automatic oiling device equipped with self-contained Thermo-Syphon System of water cooling for continuous duty.

Single stage for 27″ of mercury, without motor **145.00**

5699/32. **Ditto**—but double stage, high duty, water cooled for vacuum to within 1/10″, without motor **240.00**

5700

5703

5705

Pyrometers

The Pyrometers listed below are those which the experiences of many users have found to be the most satisfactory. We shall be glad to furnish additional information. Write for special catalog.

5700. **PYROMETER—Electric, for temperatures up to 1800° F. or 1000° C.** A reliable and durable instrument for use with laboratory electric furnaces, for industrial purposes, etc. The outfit consists of an indicating galvanometer—wide scale, graduated in temperature degrees, with convenient zero adjustment, and knife edge pointer and mirror to prevent parallax; a special form thermo couple, Pyod, the electrical resistance of which does not change with the temperature; with 25 ft. flexible connecting leads.

Complete, with portable indicator, range 75° to 1800° F. or 25° to 1000° C., and 36 inch thermo couple. Should be used only intermittently at temperatures over 1700° F. **72.60**

5701. **PYROMETER**—Indicator and remainder of outfit similar to No. 5700, but equipped with Nork wire-couple, instead of Pyod, and calibrated for temperatures up to 1100° C. or 2000° F. The Nork Wire-couple is ordinarily used without protection tubes. Space required for their insertion is ¼" x ⅛". The Nork Wire couple is 16" long, provided with cold junction extension leads 10 ft. long, and is intended especially for small crucible and combustion furnaces, where only a small space is available.... **71.50**

5701a. **Nork Wire Couple**—only with cold junction extension leads **11.50**

5703. **PYROMETER**—similar to No. 5700, but improved wall form, 6¼" scale, graduated to 1800° F. or 1000° C. Medium resistance, for use with Pyods. Indicator only **75.00**

For **Pyods,** etc., see No. 5713.

Outfit No. 5700 is supplied with a 36" Pyod. Pyods are extra for No. 5703.

5705. **PYROMETER—High Resistance Wall Type,** for Pyods or Platinum Rhodium Couples. Convenient to use, accurate and rugged, scale 7" long, **1800° F. for Pyods.** Indicator only **100.00**

5705/1. **Ditto—3000° F. for Platinum Rhodium couple.** Indicator only **100.00**

5707. **PYROMETER**—as above, 5" scale, **1800° F. for Pyods.** Indicator only **85.00**

5707/1. **PYROMETER**—as above, 5" scale, **3000° F. for Platinum Rhodium Couple.** Indicator only **85.00**

5709. **PYROMETER**—No. 5705, but double range 75–1800°F. for Pyods, 75–3000° F. for Platinum Rhodium Couple. Indicator only **110.00**

5709/1. **Ditto**—with 5" scale. Indicator only **95.00**

Couples, etc., for Nos. 5705–5709/1, see Nos 5713–5717.

5711

5713

5711. **PYROMETER—High Resistance, Portable Type,** double range, for 1800 and 3000° F., 6½" size. Indicator only **120.00**

For couples, etc., see Nos. 5713–5717.

Pyods

Used with Pyrometers Nos. 5700 and 5703, for temperatures up to 1700° F. They are recommended for Carbon Steel Hardening, annealing of metal or glass, carbonizing when done below 1700° F., Cyanide Furnace, Lead Hardening of Carbon Steel, Galvanizing or Tinning.

For parts of Pyods, see Cuts No. 5713.

B. Wire Element.
P. Tubular Element.
D. Pure Asbestos Insulation.
C–L. Connection Zone Box.
DS. Double Stuffing Box.
A. Auxiliary Compensator Couple.
W. Asbestos covered copper leads, No. 18 gauge. Double Conductor.
I. Iralume Protection Pipe.

5713. **PYODS**—18, 24, or 36 inches long **5.10**
5713/1. Ditto—48 inches long **6.90**
5713/2. Ditto—64 inches long **8.80**
5713/3. Ditto—72 inches long **10.00**
5713/4. Ditto—91 inches long **12.65**
5713/5. Ditto—125 inches long **17.60**
5713/10. **IRALUME PROTECTION PIPE**—for Pyods 12 inches long **2.20**
5713/11. Ditto—18 inches long **3.00**
5713/12. Ditto—24 inches long **3.74**
5713/13. Ditto—30 inches long **4.40**
5713/14. Ditto—36 inches long **5.00**
5713/15. Ditto—48 inches long **6.60**
5713/20. **DUPLEX COPPER LEADS—Asbestos Covered,** No. 18 gauge .....per foot **.08**
5713/22. **CONNECTION HANDLE**—for Portable Outfit **5.50**

5715

5715/30

5717

Platinum Rhodium Couple—used with Pyrometers Nos. 5705–5711 for High Speed Steel Hardening in Oven Furnace, Carbonizing above 1700° F., Forging Furnaces, and any work up to 2500° F. where couple is not to be inserted in any molten materials. The standard couples are .022″ in diameter.

	Length Inches	Price		Length Inches	Price
5715.	14 for 12″ tubes	**46.20**	5715/3.	32 for 30″ tubes	**105.60**
5715/1.	20 " 18″ "	**66.00**	5715/4.	38 " 36″ "	**125.40**
5715/2.	26 " 24″ "	**85.80**	5715/5.	50 " 48″ "	**165.00**

Refractory Insulating Tube—of double bore porcelain for above. (Should be 2″ shorter than couple.)

	For Platinum Couples length of tube, inches	Price		For Platinum Couples length of tube, inches	Price
5715/10.	12	**.75**	5715/13.	30	**1.80**
5715/11.	18	**1.10**	5715/14.	36	**2.25**
5715/12.	24	**1.50**			

Refractory, non-porous tubes—high grade resistance porcelain.

	For Platinum Couples length of tube, inches	Price		For Platinum Couples length of tube, inches	Price
5715/20.	12	**4.70**	5715/23.	30	**11.55**
5715/21.	18	**7.00**	5715/24.	36	**13.90**
5715/22.	24	**9.25**	5715/25.	48	**18.50**

5715/30. **Compensator Couple**—10 ft. length 5.0
Additional Compensator Couple over 10 ft. length .....**per foot** .4

5715/40. **Overall Sheath**—for Platinum Rhodium couples, of special high fusing porcelain, should be 1 to 3″ longer than thickness of furnace wall plus distance couple is to project into furnace. Use a standard length .....**price on application**

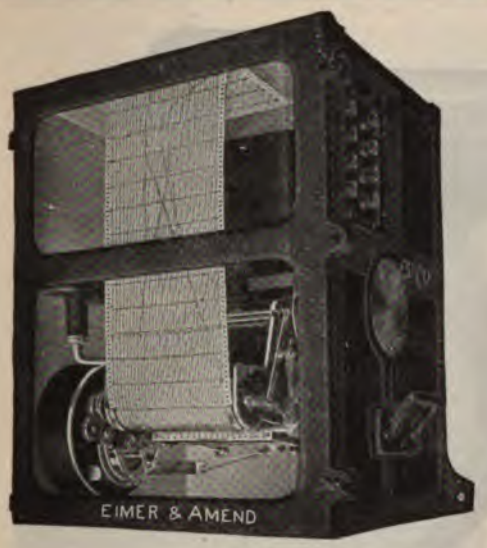
Note.—In very small furnaces overall sheath may be dispensed with.

5715/50. **Zone Box**—for Platinum Rhodium Couple..... 3.2

5715/55. **Leads**—No. 18, Python, per 25 ft. length 2.0

Switches—Dust and Fume proof, Double Pole.

		Price			Price
5717.	2 points and off	**6.00**	5717/2.	11 points and off	**30.25**
5717/1.	5 " " "	**24.20**	5717/3.	22 " " "	**60.50**



5725/1

5735

PYROMETER—Recording, a highly successful multi-record Pyrometer Recorder, taking up to six records in six colors on one sheet. Dust proof case, all metal and plate glass, operates by dry battery. Renewal quarterly. Timed by eight day clock. Paper roll and multi-color typewriter ribbon renewal monthly. The Recorder may be near to or far from furnaces. Generally an indicating pyrometer as No. 5703 or 5705 and a rotary switch as No. 5717 are placed near furnace with Recorder in office, both instruments operating from the same Pyods or platinum couples. Wiring directions are given in special catalog.

5725/1.	**Recorder**—only as above, 1 Record	260.00
5725/2.	" " " " 2 "	390.00
5725/3.	" " " " 3 "	425.00
5725/4.	" " " " 4 "	445.00
5725/5.	" " " " 5 "	460.00
5725/6.	" " " " 6 "	476.00

Standard Scales—for Nos. 5725/1–5725/6.
For Pyods to 1000° C. or 1800° F.
" " " 700° C. or 1200° F.
" " " 500° C. or 800° F.
" Platinum Rhodium Couples to 1650° C. or 3000° F.

a. Record Roll for Nos. 5725/1–5725/6 .....
b. Inked Ribbon for Nos. 5725/1–5725/6 .....

PYROMETER—Indicating L. & N. Potentiometer Type, with automatic [illegible] tion compensator. Designed to be operated by men knowing nothing abo[illegible] ments. Thermocouple readings in general can be read almost as fast wit[illegible] tiometer indicator as with a milliammeter. Potentiometer indicators a[illegible] curate around atmospheric temperatures and for high temperatures, [illegible] pyrometric device for which this is true.

5735.	**Indicator**—Range 200 to 1800° F. for L. & N. couples	[illegible]
5735/1.	" " 0 to 2000° F. " " "	[illegible]
5735/2.	" " 0 to 1000° F. " " "	[illegible]
5735/3.	" " 0 to 1100° C. " " "	[illegible]
5735/4.	" with special range	[illegible]
5735/5.	" with 2 ranges as above	[illegible]
5735/6.	" with 2 ranges, one range automatic compensated [illegible] compensated	[illegible]

5739

The L. & N. Optical Pyrometer, Morse patents, is of the type in which brightness of the standard is varied. The radiation from the body whose temperature is to be measured is brought to a focus through a lens. A trungsten lamp filament is placed in the plane of the image produced by the lens. The lamp filament receives current from a small battery contained in a portable case, also containing a rheostat and an accurate milliammeter. The incandescent filament and the image produced by the lens are observed through the eyepiece. By means of the rheostat the current through the lamp is adjusted until the brightness of the filament is just equal to the brightness of the image produced by the lens, whereupon the filament blends with or becomes indistinguishable in the background formed by the image of the hot object. This adjustment can be made with great accuracy. When a balance has been obtained the milliammeter reading is taken and the temperature obtained from the table.

Advantages

Light and portable. Sighted as easily as an opera glass.
A large surface to sight at is not required.
Distance does not matter.
Adjustment is simple and rapid.
The setting is made with great precision.
Only brightness, not color of light, is matched.

5739. **PYROMETER**—as above, range 1200 to 2500° F. (650°–1350° C.) complete with battery and rheostat in case with milliammeter thereon and sling **100.00**

5739/1. **Ditto**—with absorbing screen and special table for higher temperatures range 1200 to 3200° F. (650° to 1750° C.) **175.00**

5745. **PYROMETER—Total Radiation, double scale,** for the rapid and accurate determination of **temperatures from 1200° to 2800° F. and from 2000° to 3600° F.** This instrument is used extensively for taking temperatures in Rolling Mills, Coke Plants, Smelters, Cement Kilns and other places where objects are inaccessible or in motion. The radiators are focused on a sensitive thermocouple by means of a concave mirror. Indications are independent of distance, provided diameter of object is ten times its distance from receiving tube.

Outfit, including indicator, tube, tripod, and wiring in leather carrying case **200.00**

5745/5. **Ditto**—but with scale 600° to 1600° C. and 1100° to 2000° C. **200.00**

For cut, see next page.

5745–5745/5

5761

5768

5761. PYROMETER—Hot Blast. This instrument is based on the principle of non-expanding graphite rods, and the expansion of the steel stem enclosing the graphite, the difference in expansion being indicated on the porcelain dial in temperature degrees. Dial 6½ inch diameter, graduated to 800° F., extra large figures, legible at a considerable distance **18.00**

5763. Ditto—Graduated to 1200° F. **22.00**

5765. Ditto—Graduated to 1500° F. **30.00**

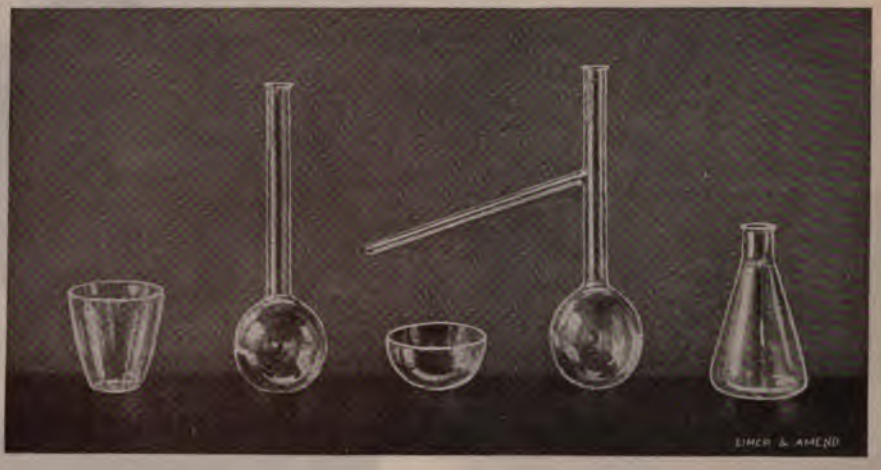
5766. PYROMETER—Siemens, Water, for temperatures up to 1800° F.; with thermometer and six copper cylinders **70.00**

5768. SEGAR CONES—For temperatures from 600° C. to 2000° C. The following are the official melting points:

Cone No.	Degrees Centigrade	Cone No.	Degrees Centigrade	Cone No.	Degrees Centigrade
022	600°	02a	1060°	19	1520°
021	650°	01a	1080°	20	1530°
020	670°	1a	1100°	26	1580°
019	690°	2a	1120°	27	1610°
018	710°	3a	1140°	28	1630°
017	730°	4a	1160°	29	1650°
016	750°	5a	1180°	30	1670°
015a	790°	6a	1200°	31	1690°
014a	815°	7	1230°	32	1710°
013a	835°	8	1250°	33	1730°
012a	855°	9	1280°	34	1750°
011a	880°	10	1300°	35	1770°
010a	900°	11	1320°	36	1790°
09a	920°	12	1350°	37	1825°
08a	940°	13	1380°	38	1850°
07a	960°	14	1410°	39	1880°
06a	980°	15	1435°	40	1920°
05a	1000°	16	1460°	41	1960°
04a	1020°	17	1480°	42	2000°
03a	1040°	18	1500°		

Packed in boxes of 100 cones each ..... per 100 **6.00**

Small quantities .....



Transparent Quartz Apparatus

This ware is unattacked by volatile acids with the exception of Hydrofluoric, and will not crack on subjection to the most violent and sudden changes of temperatures. Its melting point is about 1600° C.

5769. BEAKER—Transparent Quartz, tall form, without lip.

Capacity, cc.	50	100	150	200	250	300	400	500
Each	**6.50**	**10.50**	**12.00**	**13.50**	**15.00**	**17.50**	**20.00**	**25.00**

5769/1. BEAKER—Similar to above, with lip.

Capacity, cc.	50	100	150	200	250	300	400	500
Each	**6.50**	**10.50**	**12.00**	**13.50**	**15.00**	**17.50**	**20.00**	**25.00**

5769/2. BEAKER—Similar to No. 5769, but low form.

Capacity, cc.	50	100	150	200	250	300	400	500
Each	**6.50**	**10.50**	**12.00**	**13.50**	**15.00**	**17.50**	**20.00**	**25.00**

5869/3. BEAKER—Similar to No. 5769/2, with lip.

Capacity, cc.	50	100	150	200	250	300	400	500
Each	**6.50**	**10.50**	**12.00**	**13.50**	**15.00**	**17.50**	**20.00**	**25.00**

5770/1. Boat—Combustion, Transparent Quartz.

Length, inches	1¾	3	3	4	6
Diameter, inches	½	½	⅝	⅝	½
Depth, inches	5/16	5/16	⅜	⅜	½
Each	**1.50**	**2.75**	**3.00**	**3.75**	**5.50**

5771. CAPSULE—Rectangular, Transparent Quartz.

Approximate capacity, cc.	7	20	20
Length, inches	2 3/16	1⅞	2½
Width, inches	1 5/16	1½	1⅜
Depth, inches	⅜	⅝	⅜
Each	**2.00**	**2.50**	**2.50**

5773. CASSEROLE—Transparent Quartz.

Approximate capacity, cc.	30	75	150	200	350
Diameter, inches	2	2¾	3¼	3¾	4¼
Depth, inches	1	1⅜	1¾	2	2½
Each	**3.00**	**6.00**	**8.75**	**10.00**	**15.00**

5774. CRUCIBLE—Low, Wide Shape, Transparent Quartz.

Approximate capacity, cc.	4	10	15	25	40	65	145
Top, diameter, inches	1 1/16	1⅝	1⅝	1⅞	2¼	2⅝	3 3/16
Height, inches	¾	¾	1	1⅛	1 7/16	1¾	2
Each, without cover	**1.00**	**1.50**	**2.00**	**2.50**	**3.75**	**5.00**	**6.50**
Covers, extra, each	**1.00**	**1.65**	**1.65**	**2.00**	**3.00**	**3.75**	**5.00**

5774/1. CRUCIBLE—Platinum Shape, Transparent Quartz.

Approximate capacity, cc	10	15	20	30	50	175
Top, diameter, inches	1 1/16	1¼	1⅜	1 11/16	2	2⅞
Height, inches	1¼	1 5/16	1⅜	1½	2	3 3/16
Each, without cover	**1.50**	**2.00**	**2.25**	**2.50**	**4.75**	**7.50**
Covers, extra, each	**1.25**	**1.50**	**1.65**	**1.90**	**2.50**	**5.00**

5774/2. CRUCIBLE—Gooch, Transparent Quartz, with integral perforated bottom.

Approximate capacity, cc.	10	15	20	30
Top, diameter, inches	1¼	1 5/16	1½	1⅝
Height, inches	1¼	1⅜	1⅝	1¾
Each	**3.00**	**4.00**	**4.50**	**5.00**

5775. DISH—Evaporating, Transparent Quartz.

Approximate capacity, cc.	25	45	80	90	100	200
Diameter, inches	2	2¾	3¼	3½	3⅞	4¼
Depth, inches	13/16	1	1 3/16	⅞	1 3/16	1¾
Each	**2.25**	**3.75**	**5.50**	**6.00**	**6.25**	**8.75**

5775/1. DISH—Flat, with lip, Transparent Quartz.

Approximate capacity, cc.	20	30	75	150
Diameter, inches	2½	2⅞	3¾	4⅞
Depth, inches	½	½	11/16	13/16
Each	**2.50**	**3.75**	**6.25**	**8.75**

5776. FLASK—Boiling, Flat Bottom, Transparent Quartz.

Capacity, cc.	25	50	100	150	200	250	300	400	500	1000
Each	**4.25**	**5.75**	**7.50**	**8.75**	**10.00**	**11.25**	**12.50**	**15.00**	**17.50**	**30.00**

5776/1. Ditto—Round Bottom, same sizes and prices.

5776/2. FLASK—Boiling, Flat Bottom, Bulb Transparent Quartz, neck opaque.

Capacity, cc.	25	50	100	150	200	250	300	400	500	1000
Each	**3.50**	**5.25**	**6.40**	**7.50**	**8.75**	**9.50**	**10.50**	**12.50**	**15.00**	**25.00**

5776/3. Ditto—Round Bottom, same sizes and prices as No. 5776/2.

5776/4. FLASK—Similar to No. 5776, but with side tube for distilling.

Capacity, cc.	25	50	100	150	200	250	300	400	500	1000
Each	**6.75**	**8.25**	**10.00**	**11.25**	**12.50**	**13.75**	**15.00**	**17.50**	**20.00**	**35.00**

5776/6. FLASK—Erlenmeyer, Transparent Quartz.

Capacity, cc.	25	50	100	200	250	300	400	500
Each	**5.30**	**7.15**	**10.50**	**14.00**	**15.75**	**17.50**	**21.00**	**24.50**

5776/7. FLASK—Kjeldahl, Transparent Quartz.

Capacity, cc.	25	50	100	200	250	300	400	500	1000
Each	**5.30**	**7.15**	**10.50**	**14.00**	**15.75**	**17.50**	**21.00**	**24.50**	**42.00**

5777. PLATE—Transparent Quartz.

Thickness, inches	1/16	⅛	3/16
Thickness, mm.	1.5	3	4.5
Maximum size	5x5″ or 6x4″	5x5″ or 6x4″	3x3″
Each, per sq. inch	**.50**	**.75**	**1.00**

5779/1. ROD—Transparent Quartz, Standard lengths up to 24 inches.

Diameter, inches	1/32	1/16	⅛	3/16	3/16	¼	¼	⅜	7/16
Diameter, mm.	1	2	3	4	5	6	7	9	11
Per foot	**.50**	**.75**	**1.25**	**1.75**	**2.25**	**2.75**	**3.75**	**6.15**	**9.25**

5779/10. TRIANGLE—made entirely of **Transparent Quartz Rod.**

Length of side, mm.	50	65	75
Each	**2.30**	**3.00**	**3.50**

5780. TUBE—Test, Transparent Quartz, Heavy Wall, Lipped.

Bore, inches	½	½	⅝	⅝	¾	⅞
Length, inches	4	5	5	6	6	7
Each	**3.00**	**3.60**	**4.75**	**5.50**	**6.40**	**8.30**

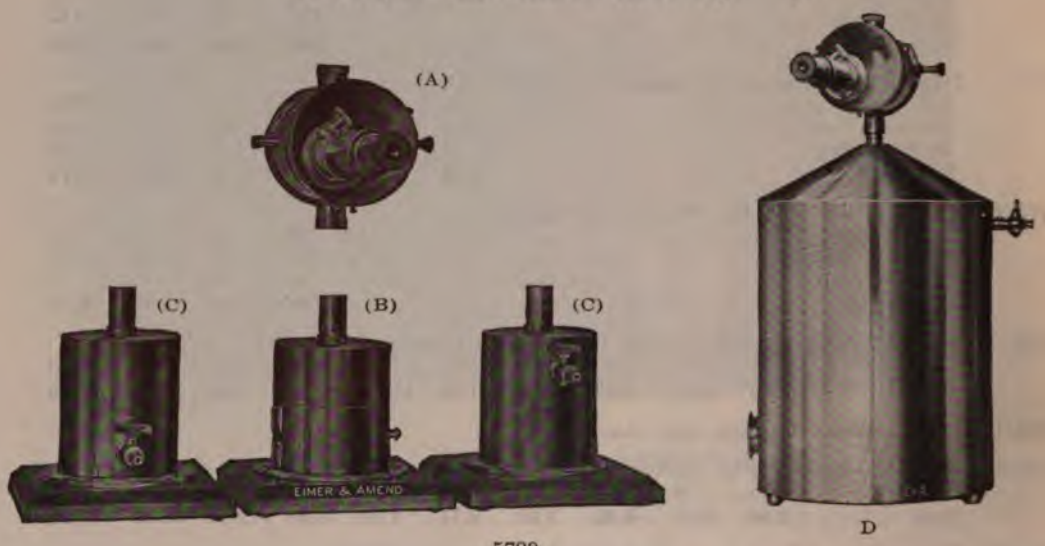
5782. TUBING—Transparent Quartz.

Bore, inches.	1/16	⅛	3/16	¼	5/16	⅜	½	⅝	¾	⅞	1
Max. length, inches.	60	60	60	60	60	60	42	42	42	24	24
Price per ft.	**1.25**	**1.90**	**2.15**	**2.90**	**3.40**	**4.00**	**6.00**	**9.00**	**11.00**	**13.00**	**14.00**

5784. TUBING—Capillary, Transparent Quartz, with bore about 1 mm.

Outside diameter, mm.	2	4	6	8	10
Price per 10 cm.	**1.00**	**3.00**	**5.00**		

Radium and Radio-Activity



5789

We carry a stock of **Radium** and **Thorium Salts,** details and prices on application.

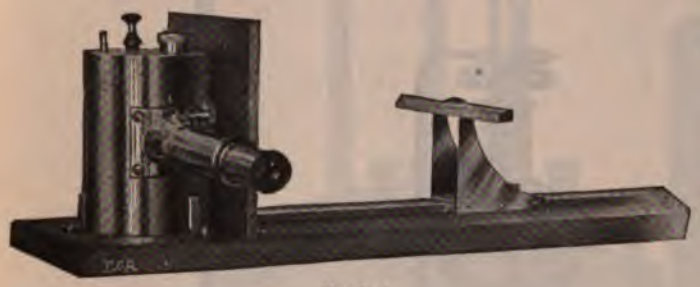
5789. **LIND INTERCHANGEABLE ELECTROSCOPE**—for Radio-Active determinations as designed and used by the United States Bureau of Mines, see Bulletin No. 176. For prices, etc., see below.

Advantages

1. Interchangeable Head.
2. Special mechanical joint to maintain gas-tightness of emanation chambers.
3. Firmly fixed position of microscope relative to the leaf.
4. Amberoid insulation throughout.
5. Ease of removing parts.
6. Provision for maintaining continuous charge on the instrument.

Parts

A.	The Head—a nickel-plated housing, containing the leaf system and supporting the microscope which has a magnification 24-fold, focal distance 32 mm. and is carried by a projecting solid front and is very firmly fixed with relation to the leaf.....	**69.30**
B.	Discharge Chamber—for Solids.....	**16.50**
C.	Gas-tight Emanation Chamber.....	**20.65**
D.	Light Walled Water Chamber.....	**16.50**
E.	Heavy Wall Water Chamber.....	**41.80**
F.	Plate for Solids .....each	**1.40**
G.	Hard Rubber Charging Rod.....	**.30**
H.	Battery Set, 350 Volts.....	**58.30**
I.	Special Gas Burette—For Emanation. For cut, see page 474, No. 5795	**10.00**
J.	Micro-Drying Bulb—for Sulfuric Acid. For cut, see page 474, No. 5795	**1.50**
K.	Separate Charging Cap	**1.65**
L.	Hand Pump—(Vacuum or Pressure)	**13.75**
M.	Wrench	**1.25**
N.	Book of 25 Aluminum Leaves....	**.40**
O.	Wooden Support	**3.30**
P.	Wooden Case—for field set	**13.75**
Q.	Stop Watch	**10.00**
W.	Pitchblend—with Radium Data...	**4.00**
X1.	Analyzed Carnotite 25 grams (about 1.5% U_3O_8)	**1.50**
X2.	25 grams Analyzed Carnotite (about 2% U_3O_8)	**2.00**
X3.	25 grams Analyzed Carnotite (about 3% U_3O_8)	**3.00**
AA.	Complete Field Outfit for Ores...	**125.00**
BB.	Complete Laboratory Outfit for Solids, Gases and Liquids (Water)	**250.00**
Ba.	Simple Laboratory Outfit for Solids, Gases and Liquids.....	**135.00**
CC.	Complete Laboratory and Field Outfit for Water Analysis	**140.00**
Ca.	Simple Laboratory and Field Outfit for Water Analysis	**150.00**
DD.	Simple Field Outfit for Water Analysis	**120.00**



5790/1

RADIOSCOPE
Size 3x8 inches

SPINTHARISCOPE
Size ¾x1⅝ inches

5791/1

5790/1. **GAMMA RAY ELECTROSCOPE**—Designed and used by the U. S. Bureau of Mines. Single unit, not interchangeable. Nickel plated brass cylinder 13 cm. high, 9 cm. in diameter, with lead lining inside 3 mm. thick **88.00**

5790/MM. **COMPLETE GAMMA RAY OUTFIT**—for the measurement of tubes of radium or of emanation, suitable for use by physicians and hospitals; consisting of the above Gamma Ray Electroscope, and stopwatch (Q) and Charging Rod (G). See preceding page **98.30**

5791/1. **Radioscope**—An instrument for detecting the presence of radio-activity in waters, ores, etc., by the scintillation method **11.00**

The construction of the radioscope is such that the emanation from any active material placed in the bottom of the instrument rises into the upper part and there comes in contact with a screen of phosphorescent zinc sulfide and produces scintillations, which are observed through an adjustable compound lens of high magnifying power.

Each Radioscope is supplied with a quantity of high grade carnotite radium ore which will show the scintillating effect of the radium rays.

5792. **SPINTHARISCOPE**—To show the radiant energy of radium salt placed on the side of a pin projecting from the center of the phosphorescent screen situated at one end of the instrument. At the other end is a high grade adjustable lens for observing the flashes of light as the radium rays strike the screen **4.40**

5793. **ZINC SULFIDE—Phosphorescent, Extra strong,** Grade A, 5 gram tube **2.00**

5793/1. **Ditto—Strong,** Grade B, 5 gram tube **1.00**

5793/BB. **RADIUM LUMINOUS COMPOUND**—Consisting of Phosphorescent Zinc Sulfide mixed with a high grade Radium Salt. This preparation is used commercially as Radium Paint, being applied to the dials of watches, clocks, etc., to render them visible at night. Each tube contains approximately ½ gram of the powder which is sufficient for rendering self-luminous the dials of about twenty watches, ½ gram. **5.00**

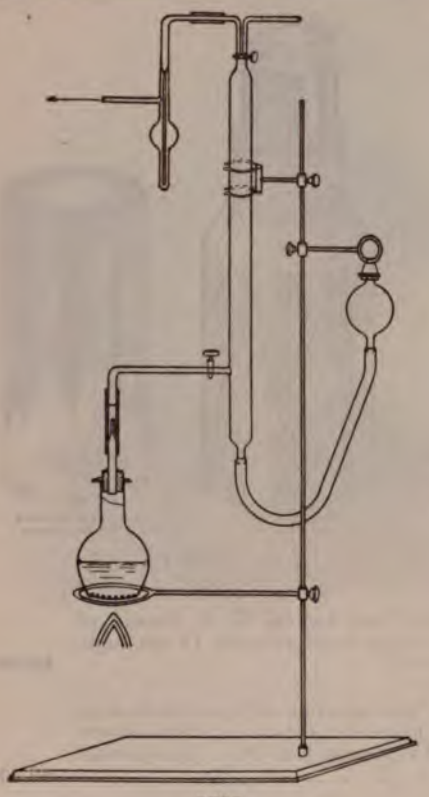
5793c. **ZINC SULFIDE—Triboluminescent**—(also Phosphorescent). Shows a marked luminosity on rubbing. Per tube of 5 grams **2.00**

5793d. **CARNOTITE—Radium Ore Specimens,** *high grade,* price according to size **each .25 to 1.00**

5795. **GAS BURETTE**—for Boiling off and Transferring Emanation. Complete **18.00**

For cut, see next page.

For details of this apparatus as well as for additional information on Nos. 5789–5793d, write for special bulletin.



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5797

5803

5797. **Radio-Oscillating Electroscope—Zeleny,** for qualitative or quantitative work in Radioactivity or other Ionization experiments, as, for example, experiments on the conductivity produced in gases. Amongst other subjects which may be studied with this instrument are X-rays; alpha, beta, and gamma rays from radio-active substances; conductivity of gases from flames; conductivity produced by ultra violet light, by glowing wires, by chemical action, by the splashing of water; the range of alpha particles; and the comparison of very high resistances. One of the novel features of the instrument is the suspended leaf, whose oscillations give definite measure of the ionization current. The change in conditions is immediately observed by a change in the frequency of the oscillations. The sensitivity of the electroscope can be varied over wide limits. Complete with attachments in wooden carrying case.. **60.00**

5803. **Selenium Cell**—Suitable for use on from 15 to 35 volts and will be found to be sufficiently sensitive to very small changes of illumination. They may be used in light telephony and all kindred subjects and are especially adapted to research work. The working surface of these cells is a circular aperture ½ inch in diameter. The Selenium is spread in a coating of approximately 1/10,000 of an inch thickness on nickel silver which has been previously heat-treated. The whole cell is baked for a number of hours, to exclude all moisture, before being hermetically sealed. Sealing is done while hot. All open spaces within the cell are filled with Canada Balsam, baked hard. Each cell is fitted with clips to hold absorption cells for spectroscopic work, enabling the student to make photometric tests on various wave lengths. Cells have about 300,000 OHMS dark resistance and 12,000 OHMS resistance at full light **32.50**

5805

5805. **COMPTON QUADRANT ELECTROMETER**—The total range of the instrument is approximately 0-50,000 mm. per volt, and the easy working range is 0-20,000 mm. per volt. The period increases with the sensitivity, and varies from approximately 2 seconds at very low sensitivities up to approximately 10 seconds at 20,000 mm. per volt. Because of the relatively small size of the electrical system, the instrument has the advantage of a very small capacity (about 12 cm.); complete as described, with 4 quartz suspensions and one needle, but without lamp and scale **115.00**

Uses

1. For measurements of very small currents or electrostatic potentials.
   a. Electronic Currents.
   b. Radio-activity.
2. For measurement of watts, volts, or amperes, direct current, and for a wide range of frequency of alternating current.
3. For comparison of very small capacities.
4. For determination of dielectric constants, losses, and other characteristics.
5. As a balance instrument in a potentiometric circuit where it is desired to measure small potentials without drawing from the source of E.M.F. being measured even the current required to balance by the use of a galvanometer.
6. As a transfer instrument, to compare currents and voltages of different frequencies; or alternating currents and voltages with direct currents and voltages.

In general the electrometer will be used where it is desired to make measurements and determinations with an almost absolute elimination of electromagnetic effects in the detector or measuring instrument.

5805a. Extra Set of 4 quartz suspensions for above..... **7.50**

5805b. Extra needle for above **7.50**

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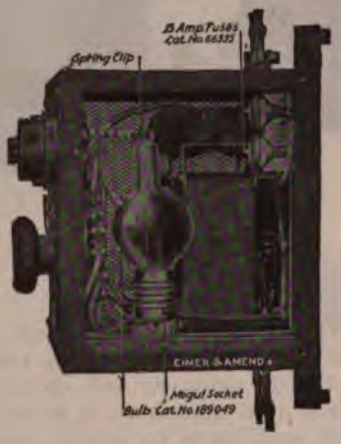

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5842

5810. **RAIN GAUGE—British Association model,** consisting of a metal cylinder japanned, 5 inches diameter, with brass rim funnel to fit as a cap; interior of the cylinder contains a metal removable receiver and graduated glass jar **9.00**

5812. **Extra graduated glasses** ..... **each 2.50**

5814. **Ditto—Official British model,** of copper, with brass rim funnel 5 inches diameter, containing graduated glass bottle; complete with Camden jar **12.75**

5816. **Extra graduated glasses** ..... **each 2.50**

5834. **RECEIVER—Fuchs,** for distillation in vacuo **7.00**

5836. **RECEIVER—Pauly,** for distillation in vacuo; with four bulbs **3.50**

5838. **RECEIVER—Raikow,** for distillation in vacuo; with four bulbs **7.00**

5839. **RECTIFIER**—To change A. C. current to D. C. For small battery charging, etc.; efficient, simple, automatic, no fire risk; 2 ampere size for charging 6 and 12 volt cells **18.00**

5839a. **Bulb**—only for No. 5839 ..... **4.00**

5839/1. **RECTIFIER**—Similar to No. 5839, but larger, 6 ampere size, for charging 6 and 12 volt cells **28.00**

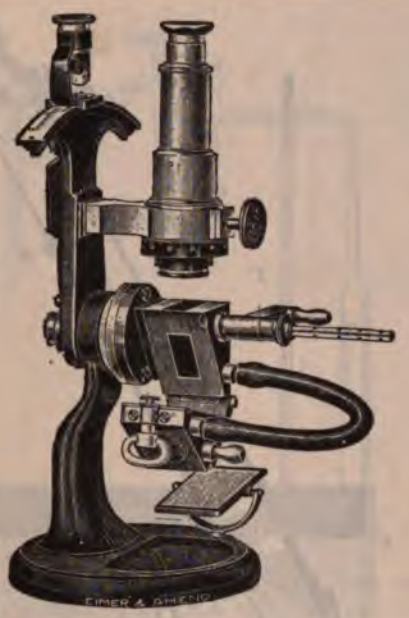
5839/1a. **Bulb**—only for No. 5839/1 ..... **8.00**

5839/2. **RECTIFIER**—Large size, 75 volt capacity, for charging 30 cells at 6 amperes. Case is of japanned sheet iron with panel on which are mounted ammeter, switch and regulating handle **130.00**

5839/2a. **Bulb**—only for No. 5839/2 ..... **8.00**

5840. **REDUCTOR—Jones,** for the determination of phosphorus in steel, by reduction of the solution by filtration through zinc; tube with funnel top and glass stopcock **2.25**

5842. **Ditto**—Complete with reservoir ground on, and stopcock, flask with side tube and stopcock; adjustable support for flask; mounted on wooden stand as illustrated **14.50**



5844

5850

Refractometers

5844. **REFRACTOMETER—Abbe,** with heating arrangement; for quickly determining with white light the refractive and dispersive powers, principally of liquids, and also of solids having one polished surface. A single drop of liquid is sufficient; the reading gives direct results, no calculations being necessary. The heating arrangement in connection with prism mounting permits the free circulation of water heated to a given temperature, thus insuring a uniform heating of substance under examination. Complete, with screw thread thermometer 0–75° C., and directions; in case with lock and key **425.00**

The graduation of the arc directly reads the refractive indices to the third place of decimal. The 4th decimal is estimated with accuracy within 2 units, say, by means of a lens which is attached to the pointer. The dispersion (C–F) may be found from the reading taken from the divided drum of the compensator, with the aid of a table supplied with the refractometer. The refractometer may be used for refractive indices between 1.30 and 1.70.

5846. **Extra thermometers** ..... **each 2.75**

5848. **REFRACTOMETER**—Same as No. 5844, but with additional scale for reading direct percentage of sugar, including thermometer 0–75° C. ..... **price on application**

5849. **REFRACTOMETER—Sugar,** according to Lowe and Schonrock; with range of refraction indices from 1.300 to 1.700. Descriptive pamphlet upon request **222.00**

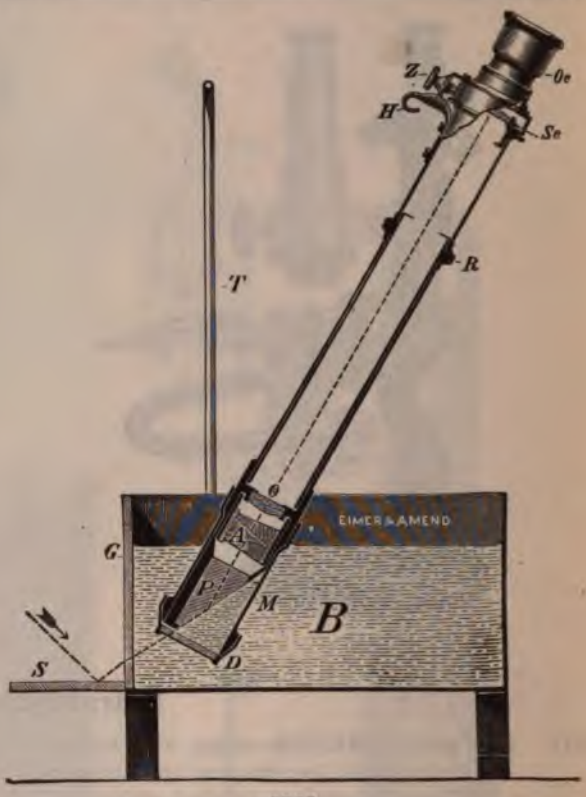
5850. **REFRACTOMETER—Butyro,** primarily intended for the examination of butter (distinguishing between oleomargarine and butter), also adapted for the refractometric examination of fats and oils; for determining the percentage of water (accuracy within ½%) in concentrated glycerine solutions, etc. The scale ranges from 1.42 to 1.49. Complete, with screw thread thermometer 0–50° C. in ½, and directions; in case with lock and key **150.75**

5852. Extra thermometers ..... **each 2.75**

5854. **Special thermometer for lard** **4.00**

5856. **Heating spiral**—with water pressure regulator **54.00**

5858–60



5862

5858. **REFRACTOMETER—Immersion,** for the examination of liquids of low refractive index, **milk serum,** acqueous, alcoholic, ethereal solutions, etc. The investigation is carried out by immersing the glass only in the fluid; scale reading from ND=1.325 to ND=1.367; in box **185.00**

5859. **REFRACTOMETER—Immersion, B. & L.,** to determine the refractive indices of fluids such as alcoholic and weak acid solutions; not suitable for milk serum.

Simple of operation. With a little experience measurements to within 0.2 of a scale division to 0.1 can be repeated. The latter value corresponds to from 3.5 to 4.0 units in the fifth decimal place for the D line. Packed in a neat wooden case **225.00**

Accessories for Nos. 5858 and 5859

5860. **Vessel A**—Accommodates 10 beakers each of 20 cc. capacity, for rapid examination of a number of liquids at the same time; with window in bottom, and reflecting mirrors; complete with 24 beakers **23.00**

5862. **Vessel B**—For individual tests; with window in front side and mirror **12.00**

5864. **Thermometer**—Graduated 15–25° C. in 1/10th, in nickel plated metal tube **8.50**

5866. **Heating Spiral**—with water pressure regulator **54.00**

5868. **Auxiliary Prism**—For the examination of very small quantities of liquid, and deeply colored solutions **9.00**

5880. **REFRACTOMETER—Universal, Pulfrich,** for refractrometric and spectrometric investigations. Complete in case with one Geissler H tube; without prism **351.50**

To order only.

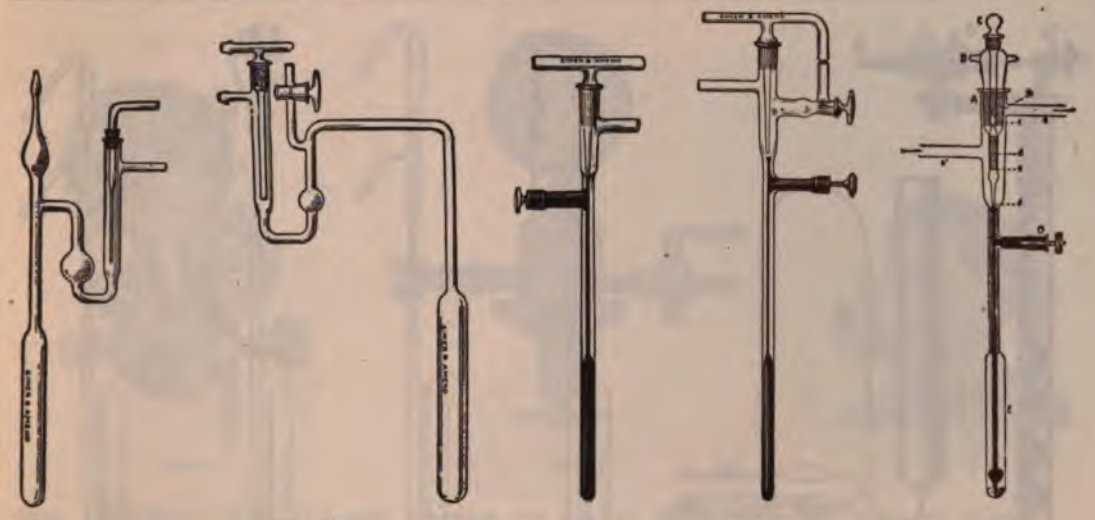
Interferometers

For the Optical Analysis of Gases and Water, for Technical and Scientific Research Purposes

With the Gas Interferometer the limit of error is about the same as by the exact method of analysis of gases with mercury.

The Water Interferometer is five to fifty times more accurate than the Dipping Refractometer.

We do not regularly carry a stock of these instruments, but shall gladly send descriptive literature and procure the interferometer suitable for your requirements, upon receipt of specifications.



5924 5930 5932 5934 5936

5924. **REGULATOR—Gas, Dunham,** very satisfactory for incubators and low temperature work; glass parts only **2.00**

5926. **Ditto**—filled, ready for use **4.00**

To permit the easy filling of this regulator, the upper part is drawn to a fine point and left open until filled, when it is closed in the flame. To refill, the point is broken, and again resealed after filling.

5930. **REGULATOR—Gas, Poetsche** (Journal of Am. Chem. Soc., Vol. XXXI, No. 11, p. 1218). Very efficient for either low or high temperatures. The large air chamber renders it very sensitive; filled **8.75**

5932. **REGULATOR—Gas, Reichert,** with micrometer screw, filled **5.00**

5934. **Ditto**—with stopcock **7.00**

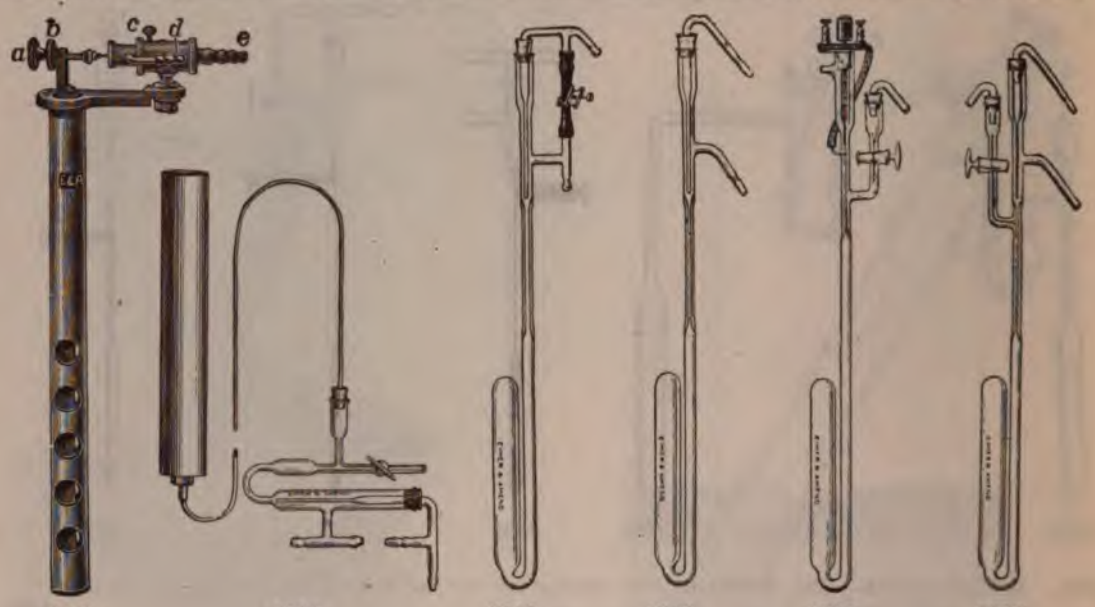
5936. **REGULATOR—Gas, Reichert-Novy,** very efficient for low and high temperatures, especially in conjunction with Murrill gas pressure regulator; with micrometer screw, filled **8.00**

5938. **Ditto**—with glass stopcock, for regulating mercury, eliminates the possibility of leakage... **10.00**

5940

5940. **REGULATOR—Gas, Beans,** very efficient and reliable for low and high temperatures, especially with variable gas pressures; complete as illustrated **45.00**

The action of the Beans Regulator depends upon the well-known principle of thermostat spring, which "makes" and "breaks" a circuit between platinum contacts through an electromagnet, which in turn controls the action of a ball valve in the gas inlet to the burner. Since both contact points are of platinum, the apparatus will work for an indefinite period of time without appreciable oxidation and corrosion of these contacts, as is the case when mercury forms one of them. Furthermore, since the ball valve is always either entirely open or closed, variation of the gas pressure within very wide limits produces no effect on the efficiency of the apparatus.



5942 5944 5946 5948 5850 5952

5942. **REGULATOR—Gas, Roux, bimetallic,** for accurate regulation of temperature without mercury, or any liquid; length 10 inches **13.25**

5944. **REGULATOR—Gas, Ostwald,** especially suitable for thermostats; complete as illustrated, with copper capillary tube 1 meter long, and metal air cylinder **7.50**

5946. **Ditto**—with pinchcock by-pass **2.50**

5948. **Ditto**—Another form, without by-pass **2.25**

5950. **Ditto**—Another form, electrically operated; with reservoir on side with stopcock **11.00**

5952. **Ditto**—same as No. 5950, but not electrically operated **5.00**

5954

5958

5954. **REGULATOR—Gas Pressure, Murrill,** of polished copper; very satisfactory for delivering gas at constant pressure, to insure close accuracy of the gas regulator **14.00**

5958. **REGULATOR—Gas Pressure,** dry, with regulating stopcock; used with photometers, etc., also in Gas Apparatus, No. 3556 ..... **20.00**

5960

5962

5974

5960. **REGULATOR—Constant Pressure, for oxygen tanks.** Will deliver oxygen at any uniform pressure up to 40 pounds per square inch. One of the gauges shows the pressure at which the oxygen is delivered, while the other gauge shows the pressure in the tank **38.50**

5961. **REGULATOR—Constant Pressure, Oxy, for oxygen tanks;** to reduce and regulate the oxygen pressure. The regulator is equipped with a copper diaphragm insuring exact pressure, also two springs, one in back and one in front of the body, which gives a neutral position of diaphragm at all times.

Equipped with gauges 3,000 pounds tank pressure and 100 or 200 pound working pressure, according to requirements **33.00**

5961/1. **Ditto—Small.** Equipped in the same manner, but built smaller to take care of lower pressure. With 3,000 pound tank pressure and 50 lb. working pressure **30.00**

5962. **REGULATOR—Constant Pressure, for carbonic acid tanks.** Will deliver at uniform pressure up to 30 pounds per square inch **22.50**

5963. **REGULATOR—Constant Pressure, for carbonic acid tanks.** Equipped with one 300 or 500 pound pressure gauge **22.00**

RESERVOIRS—Glass, levelling; for water or mercury, see No. 1274.

5972. **RESPIRATOR—Rubber,** for protecting the throat and lungs when the atmosphere contains dust or poisonous gases. Cut similar to No. 5974 ..... **2.00**

5973

5973. **RESPIRATOR HOOD** — for poisonous dust, fumes or acid conditions, where a face, head and neck covering as well as breathing protection is required. Supplied with sponge filter respirator. The hood is of acid proof cloth. The lookouts are of mica and are also acid proof. Suitable for workmen operating in dripping, flying or spattering acid or acid spray. Light and comfortable. Open at bottom for ventilation. Not suitable for ammonia, acid or other deadly fumes, for which see No. 5975 ..... **5.00**

5974. **RESPIRATOR—Aluminium,** with inflatable rubber cushion to fit the face perfectly, making it absolutely firm and dust tight **3.00**

5975

5975a

5975. **RESPIRATOR—U. S. Army Mask,** improved for industrial use **25.00**

Features

Protection against a wide range of industrial gases, fumes, smoke and dust, also against a mixture of organic gases and ammonia or acid.

Facepiece can be worn with comfort.

Clear vision at all times through the eyepieces.

Low breathing resistance.

Light weight.

The masks are recommended for use in the following industries:

Oil Refineries, Paint, Acid, Ammonia, Rubber and Varnish Manufacturers, Dye Works, Chemical Plants, Steel Mills, Paper and Pulp By-Products, Dry Cleaning, Explosives, Fertilizer, Glass Etching, Meat Packing, Tinning and Galvanizing, Ice and Storage Plants, Smelters, Water Purification, Fire Departments, etc.

These Masks are suitable for practically every condition of gas fume dust or smoke. In placing order, give fullest possible details of conditions to be met, as the chemical for the canister must be modified accordingly.

There are special canisters for the following:

Acetone	Chloroform	Methyl Alcohol
Acetic Acid	Chlorbenzene	Nitrogen Peroxide
Alcohol	Chloracetone	Nitric Acid
Ammonia	Chlorpicrin	Oxalic Acid
Amyl Alcohol	Cyanogen Bromide	Organic Dye Vapors
Aniline	Dusts	Oily Vapors
Arsenic	Ethyl Chloride	Phosgene
Arsenic Trichloride	Ether	Picric Acid
Arsine	Formic Acid	Petroleum Distillate
Benzine	Formaldehyde	Sulfur Dioxide
Carbolic Acid	Gasoline	Sulfuric Acid Fumes
Carbon Dioxide (Carbonic Acid)	Hydrocyanic Acid	Sulfuric and Nitric Mixed
	Hydrochloric Acid	Silicon Tetrachloride
Carbon Disulfide	Hydrogen Sulfide	Sulfur Trioxide
Carbon Tetrachloride	Lead Fumes	Toluene
Caustic Soda and Potash	Lacquer	Tin Tetrachloride
Chlorine	Mercury Fumes	Titanium Tetrachloride

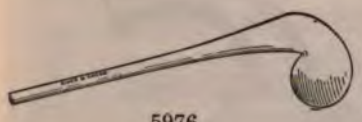
5975a. **KUPRAMITE**—the patented absorbent developed by the Government for protection against strong ammonia fumes in the nitrate industry. Per canister **3.00**

Summary

Gas Filter Masks should not be used where there is:

a. Carbon monoxide, illuminating, producer, blast furnace, methane gas, or any gas containing these.
b. Not enough air to support a lantern flame.
c. Dangerous gas at higher concentration than the canister is intended for or after the canister shows signs of exhaustion.
d. Gases other than the canister is intended for. Always be guided by the canister label and instructions.

Retorts



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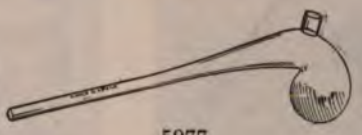

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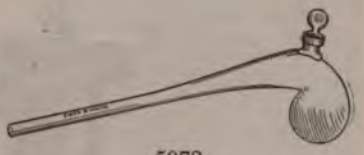

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5985

5976. **RETORT—Resistance Glass, Plain.**

Capacity, cc.	60	125	250	500	1000
Each	.70	.80	.90	1.00	1.25

5977. **RETORT—Resistance Glass, Tubulated.**

Capacity, cc.	60	125	250	500	1000
Each	1.00	1.20	1.35	1.50	1.75

5978. **RETORT—Resistance Glass, Tubulated, and Glass Stoppered.**

Capacity, cc.	60	125	250	500	1000
Each	1.30	1.50	1.60	1.80	2.20

5981. **RETORT—Pyrex Glass, Plain.**

Capacity, cc.	60	125	250	500	1000
Each	1.10	1.30	1.50	2.50	3.00

5983. **RETORT—Pyrex Glass, Tubulated.**

Capacity, cc.	60	125	250	500	1000
Each	1.40	1.60	2.00	3.00	3.50

5985. **RETORT—Pyrex Glass, Tubulated and Glass Stoppered.**

Capacity, cc.	60	125	250	500	1000
Each	1.70	1.90	2.30	3.50	4.00

5987. **RETORT—Stoneware, Tubulated and Stoppered.**

Capacity, gallons	¼	½	1	1½
Each	4.50	7.50	8.50	12.00

5988

5990

5992

5988. **RETORT—Copper,** heavy, conical; for making oxygen; capacity ½ gallon **10.50**

5990. **RETORT—Copper,** heavy; for making oxygen; with iron clamp and brass delivering tube, fitted by ground joint.

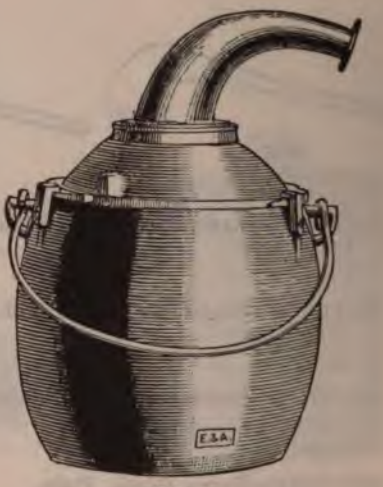
Capacity, pints	½	1	2	4
Each	3.00	3.50	4.25	5.70

5992. **RETORT—Copper, tin lined,** for distilling water, alcohol, etc.

Capacity, gallons	½	1	2	3	5
Each	9.65	13.25	16.65	22.30	29.75

5994

6000



5995

5994. **RETORT—Iron,** for distilling mercury, etc.; removable cover fastened by screw clamp; delivery tube ground to the cover.

Capacity, pints	¼	½	1	2	gallons	½	1	2
Each	**4.00**	**4.50**	**5.00**	**5.50**		**7.00**	**10.00**	**12.00**

In using above retorts for distilling mercury, some form of cement should be employed, as the ground iron surfaces are not quite tight enough to entirely prevent the escape of **poisonous** Mercury fumes. A satisfactory cement for this purpose can be made by adding minium and powdered asbestos to glycerine till a thick paste is formed.

5995. **RETORT—Iron, Porcelain lined,** portable, to distill small quantities for laboratory purposes. Cover is ground to fit tightly.

Capacity, gallons	1	2	3	5
Each	**12.50**	**13.50**	**16.00**	**19.00**

6000. **RETORT—Skidmore Retort and Crucible,** of thin spun iron, which allows the retort to be easily heated to a red heat in the flame of an ordinary Bunsen burner.

Capacity, ounces	1½	6
Each	**1.35**	**2.00**

Retort—with stirrer, used for experiments in hydrogenating oil, see No. 177/1.

Retorts—for distilling water, fractionating oil, testing wine, etc., see Distilling Apparatus.

Retort Racks—see Supports.

Rheostats

Laboratory Sliding Contact Tube Rheostat

These rheostats are extensively used by various Governmental Departments, Educational Institutions, Testing Laboratories, etc., and have given complete satisfaction. The resistance element in this type of rheostat is wound on a metal tube, thereby giving good ventilation. The element, bare wire or strip, is made from a special resistance alloy.

6001 Single

6001/1 Universal

LABORATORY SLIDING CONTACT TUBE RHEOSTAT—Continued.

The **Single** type is shown above; the **Double** type, not shown, consists of two single rheostats mounted together, but having only one slider contact. The **Universal** rheostat as illustrated has two tubes of the same dimensions and each tube is provided with slider contact and three binding posts. The resistances may be used separately or connected in series or parallel.

6001. **RHEOSTAT—Sliding Contact Tube type,** constructed for regulating small currents in the smallest possible step without opening of the circuit. The rheostats in continuous duty work, with their rated current capacities, will have a temperature rise of approximately 200° C.; size of tube 8″ long by 1.6″ diameter.

No.	Continuous Capacity	Approx. Resistance	Vertical Type	Double Type	Universal Type
A	0.3 Amps.	1300 Ohms.	**12.50**	**17.50**	**20.00**
B	0.4 "	700 "	**12.50**	**17.50**	**20.00**
C	0.6 "	375 "	**12.50**	**17.50**	**20.00**
D	1.0 "	250 "	**12.50**	**17.50**	**20.00**
E	1.2 "	150 "	**12.50**	**17.50**	**20.00**
F	1.5 "	90 "	**12.50**	**17.50**	**20.00**
G	2.0 "	50 "	**12.50**	**17.50**	**20.00**
H	2.8 "	25 "	**12.50**	**17.50**	**20.00**
I	3.3 "	20 "	**12.50**	**17.50**	**20.00**
K	5.0 "	10 "	**12.50**	**17.50**	**20.00**
L	6.5 "	6.0 "	**12.50**	**17.50**	**20.00**
M	8.5 "	3.0 "	**12.50**	**17.50**	**20.00**
N	12.0 "	1.6 "	**12.50**	**17.50**	**20.00**

6001/1. **RHEOSTAT**—Same as above, but 16″ long.

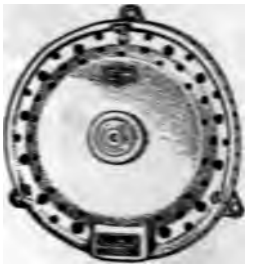
No.	Continuous Capacity	Approx. Resistance	Vertical Type	Double Type	Universal Type
A	0.3 Amps.	3200 Ohms.	**16.25**	**23.75**	**26.25**
B	0.4 "	1750 "	**16.25**	**23.75**	**26.25**
C	0.6 "	920 "	**16.25**	**23.75**	**26.25**
D	1.0 "	630 "	**16.25**	**23.75**	**26.25**
E	1.2 "	370 "	**16.25**	**23.75**	**26.25**
F	1.5 "	210 "	**16.25**	**23.75**	**26.25**
G	2.0 "	120 "	**16.25**	**23.75**	**26.25**
H	2.8 "	70 "	**16.25**	**23.75**	**26.25**
I	3.3 "	50 "	**16.25**	**23.75**	**26.25**
K	5.0 "	25 "	**16.25**	**23.75**	**26.25**
L	6.5 "	14 "	**16.25**	**23.75**	**26.25**
M	8.5 "	8 "	**16.25**	**23.75**	**26.25**
N	12.0 "	4 "	**16.25**	**23.75**	**26.25**

6002. **RHEOSTAT—Laboratory, Type R.** These inexpensive instruments are considerably used for laboratory purposes. The active parts, having a rolling contact, are of simple construction, well made, and if used properly should last indefinitely. When ordering please state voltage. For cut, see next page.

No.	186	189	194	197
Maximum amperes—1st step	1.0	2.0	6.0	12.5
Ampere capacity with entire rheostat in circuit	0.5	1.0	3.0	6.2
Total Ohms	80	40	13.3	6.5
Each	**6.00**	**6.00**	**9.75**	**14.35**

6002

6002/1



6003

Plate Type Rheostats

These rheostats consist of small coils of wire of low temperature coefficient, assembled in retaining plate of special compound. The units being imbedded in cement, no visible arcing is produced in case rheostat is burned out by overloading, consequently danger of fire is eliminated. Plates are rated 5 to 10 amperes for continuous service. For higher current capacities plates are connected in multiple. Used for field rheostats; theater dimmers; speed regulation for small motors, etc.

6003. **RHEOSTAT**—as above, 125 to 160 volts.

Amperes Max.	Amperes Min.	Total Ohms of Rheostat	Minimum Ohms of Field	Number of Steps	Size of Plate	Price
Resistance of Rheostat 1.6 Times Resistance of Field.						
1.0	.39	250	160	28	1–10"	9.15
2.0	.78	125	80	28	1–10"	9.15
3.2	1.23	80	50	28	1–10"	9.15
4	1.54	64	40	28	1–10"	9.15
5	1.9	50	32	43	1–12"	12.30
6.4	2.4	40	25	43	1–12"	12.30
8	3.1	32	20	62	1–15"	15.90
10	3.9	25	16	62	1–15"	15.90
12.5	4.43	20	12.5	124	2–15"	36.75
16	6.15	16	10	124	2–15"	36.75
20	7.8	12.5	8	124	3–15"	54.00
25	9.8	10	6.4	124	3–15"	54.00
32	12.3	8	5	124	4–15"	72.00
40	15.4	6.4	4	124	5–15"	90.00
50	19.5	5	3.2	124	6–15"	109.50

6003/1. **RHEOSTAT**—as above, 250 to 820 volts.

Amperes Max.	Amperes Min.	Total Ohms of Rheostat	Minimum Ohms of Field	Number of Steps	Size of Plate	Price
Resistance of Rheostat Equal to Resistance of Field.						
.32	.16	1000	1000	28	1–10"	12.70
.5	.25	640	640	28	1–10"	10.45
.8	.4	400	400	28	1–10"	9.15
1.0	.5	320	320	28	1–10"	9.15
2.0	1.0	160	160	28	1–10"	9.15
3.2	1.6	100	100	43	1–12"	12.20
4.0	2.0	80	80	43	1–12"	12.20
5	2.5	64	64	62	1–15"	15.90
6.4	3.2	50	50	62	1–15"	15.90
8	4	40	40	124	2–15"	36.75
10	5	32	32	124	2–15"	36.75
12.5	6.3	25	25	124	3–15"	54.00
15	7.5	20	20	124	3–15"	54.00
20	10	16	16	124	4–15"	72.00
25	12.5	12.5	12.5	124	5–15"	90.00
30	15	10	10	124	6–15"	109.50

6004

6006

6008

6010

6012

6004. **RINGS—Concentric, of copper,** tinned inside for water baths, etc.

Set of	4	4	5	5	6	7
Outside diameter of largest, inches	4	5	5½	6	8	10
Per set	**.90**	**1.10**	**1.25**	**1.40**	**2.45**	**3.95**

6006. **RINGS—Concentric, of porcelain,** with cover.

Set of	4	5	6	7
Outside diameter of largest, inches	5	6¼	8	9¾
Each	**1.20**	**1.65**	**2.20**	**2.70**

6008. **RINGS—Iron,** with long rod for fastening to retort stands.

Diameter, inside, inches	2	3	4	5	6	7	8
Each	**.12**	**.14**	**.18**	**.20**	**.25**	**.28**	**.32**

Fasteners extra, see Clamps.

6010. **Ditto—with fastener** for attaching to retort stands.

Diameter, inside, inches	1¼	2	3	4	5
Each	**.18**	**.22**	**.28**	**.32**	**.36**

6012. **Ditto—with side plates** for funnels.

Diameter, inside, inches	¾	1¾	2¼	2¾	3½	4½
Each	**.22**	**.24**	**.28**	**.32**	**.38**	**.46**

6014

6018

6020

6014. **RINGS—Concentric, of iron,** with fasteners for attaching to retort stand; set of five, diameter outside of largest 6½ inches ..... **.70**

6018. **RINGS—Straw,** plaited; superior make.

Diameter, inside, inches	2	3	4	5	6	8½	10	12

Each ..... **prices on application**

6022

6020. **RINGS—Suberite,** compressed cork; for supporting flasks, etc.

Diameter, inside, inches	1⅛	2⅜	3½	4¾	6	7
Each	**.35**	**.70**	**.80**	**1.25**	**1.70**	**2.00**

6022. **RINGS—Suberite Mats,** for supporting beakers, etc. Diameter 4¾ inches.

Thickness, inches	⅜	¾	1½
Each	**.30**	**.40**	**.65**

ROASTING DISHES—See Dishes.

6024

6026

6032

6034

Rubber Goods

Rubber Aprons and Sleeves—see page 8.

Rubber Bands, Catheters, Nipples, Atomizers, Syringes, Water Bags, etc.—write c/o Drug Department.

Rubber Bags—see Nos. 3650–3652.

Rubber Bulbs—See **Bulbs.**

6024. **RUBBER—Caps,** for test tubes; tall shape.

Diameter, inches	3/8	1/2	3/16	3/4
Per dozen	1.00	1.10	1.20	1.25

6026. **RUBBER—Caps,** for test tubes; flat shape.

Diameter, inches	5/8	3/4
Per dozen	1.10	1.20

Rubber Cement—see No. 1777/1.

6028. **RUBBER—Cloth,** pure gum, thin ..... **per ounce** **.45**

Rubber Covers—for Balances, see No. 458.

Rubber Dam—see No. 6028.

Rubber Discs—for Blowers, see page 72.

Rubber Finger Cots—see Nos. 3004–3006.

Rubber Funnels—see Funnels.

Rubber Gloves—see Gloves.

Rubber Gooch Crucible Holders—Bailey, Walters, etc., see Crucibles.

6032. **RUBBER—Policemen,** for scraping precipitates from the sides of beakers, etc., for use on glass rod. Without rods.

For rods, diameter, inches	1/8	3/16
Per dozen	.60	.80

6034. **RUBBER—Policemen,** cone shape, for use on glass rod; without rods ..... **dozen** **1.00**

6036. **RUBBER—Sheeting,** white, vulcanized; 36 inches wide, per yard **1.00**

Rubber Tissue—see No. 6028.

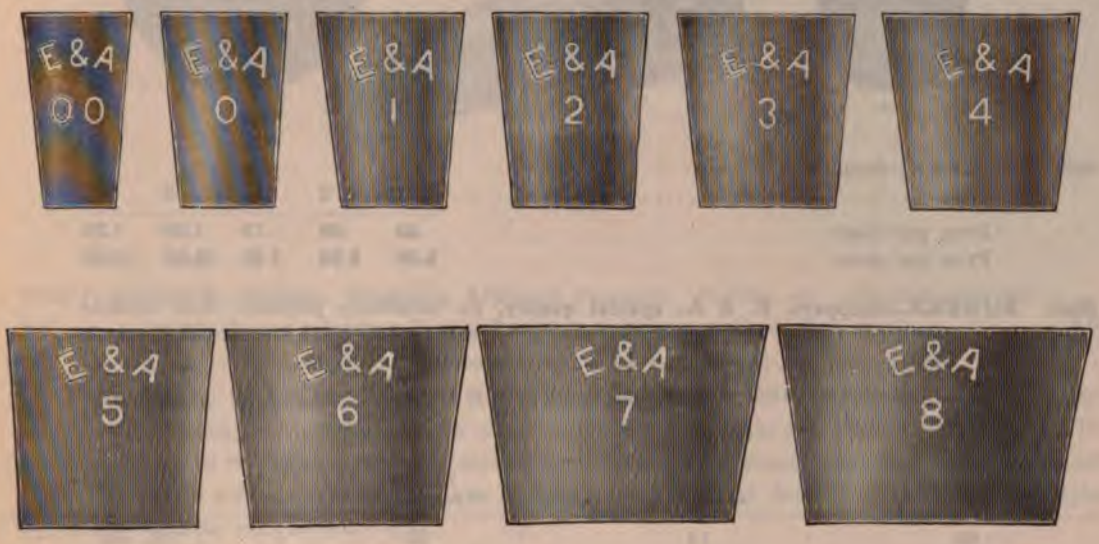
Apparatus for Testing Rubber

Under **Balances, Young's Gravitometer,** No. 406, and the **Chainomatic Specific Gravity Balances,** Nos. 213/1 and 221.

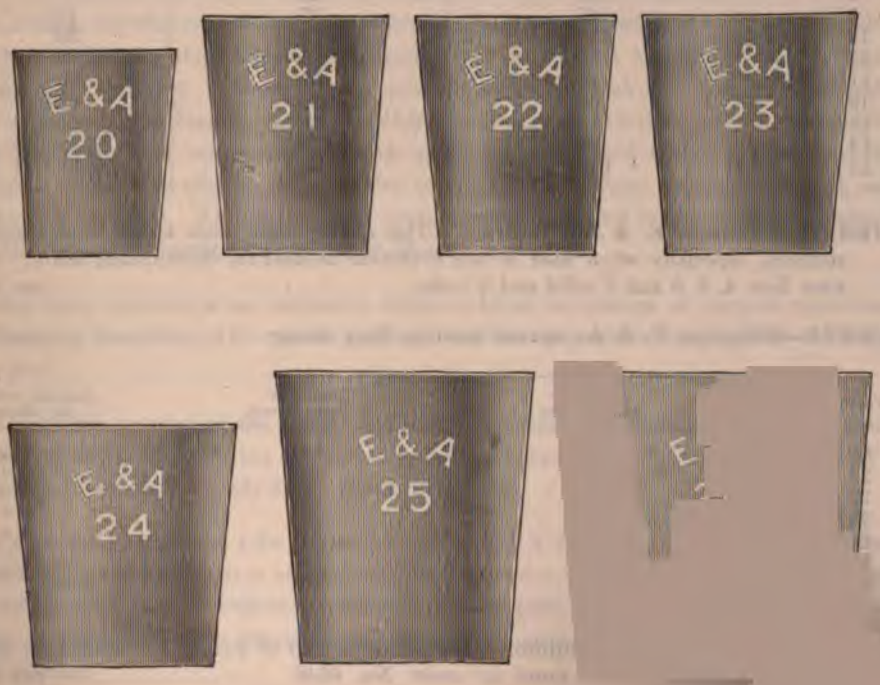
Burettes, see pages 109–114. Under **Extraction Apparatus,** the **Underwriters,** Nos. 2846–2849, the **Pickel,** No. 2817/1, and the **Bailey-Walker,** No. 2817-J. Under **Furnaces,** the **Replaceable Unit Muffles,** Nos. 3363–3365.

Hydrometers, see pages 316 to 321. Under **Ovens,** the **Freas Regular,** No. 4816 and the **Conditioning,** Nos. 4823–4835/1, also the **Emerson Conditioning Oven.** For **Pipettes,** see pages 433 to 436. For **Strength Tester,** see No. 5081. For **Viscosity of Rubber Solutions,** see **MacMichael Viscosimeter,** also the **Bingham and Green Viscometer,** under Viscosimeters.

Actual size illustrations of REGULAR LENGTH Stoppers No. 6040.



Actual size illustrations of LONG SHAPE Stoppers No. 6042.



6039

6041

6039. **RUBBER—Stoppers, No-Air.**

Sizes	1	2	2½	3	4
Price per dozen	.50	.65	.75	1.00	1.20
Price per gross	5.00	6.50	7.50	10.00	12.00

6040. **RUBBER—Stoppers, E. & A., special quality,** for laboratory purposes, most durable —will not harden with age. Each stopper of this quality bears our initials, E. & A. Either solid, one, two or three holes; price according to weight .....**per lb.** **1.60**

Note:—Our stock of three-holed stoppers is limited to sizes 4–10. Other sizes made to order.

Number	Diameter at top, mm.	Diameter at bottom, mm.	Approx. weight per dozen
00	14	10	1½ ozs.
0	17	12	2 "
1	18	15	3 "
2	20	16.5	3½ "
3	23	18	5½ "
4	25	20	6 "
5	27	23	7 "
6	32	26	10½ "
7	37	30	13 "
8	41	33	17 "
9	45	37	19 "
10	50	42	30 "
11	56	50	32 "
11½	64	52	35 "
12	65	59	43½ "
13	70	60	50½ "
14	88	75	7 lbs. 14 ozs.
15	100	81	9 lbs. 14 ozs.

6041. **RUBBER—Stoppers, E. & A., "Sulfree."** This quality lasts much longer than regular stoppers, especially when used in the evolution method for determining sulfur. In. sizes Nos. 4, 5, 6 and 7 solid and 2 holes .....**per lb.** **3.20**

6042. **RUBBER—Stoppers, E. & A., special quality, long shape** .....**per lb.** **1.60**

Number	Diameter at top, mm.	Diameter at bottom, mm.	Approx. weight per dozen
20	22	17	5 ozs.
21	25	19	6½ "
22	27	21	8½ "
23	29	22	9 "
24	31	24	11 "
25	34	28	18 "
26	40	34	23 "

6044. **RUBBER—Stoppers, red or antimony,** most durable, and of quality best suited for laboratory purposes. Sizes, same as under No. 6040 .....**per lb.** **4.00**

6045/1

6045/1. **RUBBER—Stopper, Gramercy Armored,** Patented. Flexible and well made; for use with organic solvents. Forms a vacuum tight joint with a glass vessel **5.00**

The stopper as furnished consists of a tapered elastic body with hole through center. The entire outside surface, including the hole through the center, is covered with a continuous surface of block tin. The block tin lining of the hole is continued in the form of a tube for about 45 mm., as shown in the cut. Other material as gold or platinum, etc., can be used instead of tin if desired. Special sizes and styles, *e.g.*, solid, two-hole, etc., to order only.

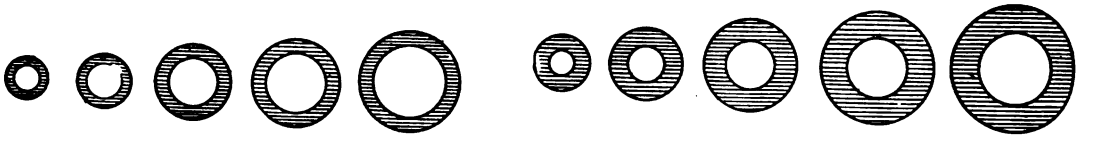
Dimensions 32.5 mm. top, 20 mm. bottom, length 82 mm., diam. opening approximately 10 mm., length of tube beyond stopper approximately 45 mm. Covers the range of 3 sizes of rubber stoppers, namely Nos. 4, 5, and 6.

This stopper is especially recommended for the syntheses of organic compounds by condensation, dehydration, etc., carried out with or in volatile organic solvents; for the solution of materials in these solvents by boiling; for the evaporation and recirculation of hot condensed solvent, for example, with a reflux condenser; also for the fractional evaporation and purification of solvents and the recovery of extracted material therefrom. Among volatile solvents are included alcohol, acetone, ether, ethyl chloride, chloroform, carbon tetrachloride, carbon disulfide, amyl acetate, petroleum, ether, benzine, benzene, toluene, aniline, etc. Such solvents attack and soften both cork and rubber, particularly the latter, so that stoppers of materials such as these are not only spoiled for future use, but often leak and cause fire during the first operation. Also they usually contaminate the solvent or the material dissolved therein or both, so that accurate quantitative work may become impossible.

Ground glass connections are expensive, liable to break on account of unequal expansion, and liable to leak from the dissolving of the grease regularly used to make them tight. They are frequently difficult to secure.

The block tin covering of the Gramercy Stopper is heavy and strong, but a certain amount of care should be exercised in inserting the stopper, so as to avoid injury, also for the regular stopper of tin, care should be taken against the acids which attack this metal.

The upper end of the tin tube is reamed out so that a glass tube, as for example a condenser, can be inserted and a tight connection effected by a twisting motion. Should there be too much play between the two tubes, a convenient method of obtaining a tight joint is to wrap tin foil around the end of the glass tube, allowing the foil to extend slightly beyond the glass, and then insert by means of a gentle rotating movement.



⅛" 3/16" ¼" 5/16" ⅜" ⅛" 3/16" ¼" 5/16" ⅜"

6046 6048

6046. **RUBBER—Tubing, light wall, best white,** cloth finished. This tubing is of extra quality, specially made for laboratory purposes; it is much more durable for general use than similar tubing on the market. In 12 foot lengths, or less.

Approximate weight in ounces, per 12 ft. length, shown below.

Diam. inside, in.....	⅛	3/16	¼	5/16	⅜	½	⅝	¾	1
Wall thickness, in..	1/16	1/16	1/16	1/16	1/16	1/16	3/32	3/32	3/32
Per 12 ft. length, oz.	4	6	9	11½	13	17	27	31	45
Price per ft.....	.05	.08	.11	.15	.17	.21	.35	.40	.56

Price per lb 1.60

6048. **RUBBER—Tubing, heavy wall, best white,** cloth finished. Specially made for laboratory burner connections—the best for this purpose, as it does not kink. Each original 12 ft. length of this tubing bears our registered trade mark, "E. & A." In 12 foot lengths or less.

Approximate weight in ounces, per 12 ft. length, shown below.

Diam. inside, in.....	⅛	3/16	¼	5/16	⅜	½	⅝	¾	1
Wall thickness, in..	⅛	⅛	⅛	⅛	⅛	⅛	⅛	⅛	⅛
Per 12 ft. length, oz.	7	17	23	25	28½	37	39	45	65
Price per ft.....	.09	.21	.29	.31	.37	.46	.49	.56	.81

Price per lb. 1.60

6050. **RUBBER—Tubing, heavy wall, white,** for lead burners; smooth finish ¼ inch inside diameter. Can be had in one continuous 100 ft. length. Price per pound 1.00

6052. **RUBBER—Tubing, light wall, black,** of pure, unvulcanized gum, seamless and will not tear. The best tubing made, and by far the cheapest in the end.

Approximate weight in ounces, per 12 ft. length, shown below.

Dia. inside, in.	⅛	5/32	3/16	¼	5/16	⅜	½	⅝	¾	1
Wall thickness, inches	1/32	3/64	3/64	1/16	1/16	3/32	3/32	7/64	7/64	⅛
Per 12 ft. lgth., ounces	3	4	5½	6½	11	13	18½	24	36	43
Price per ft...	.07	.09	.13	.15	.26	.30	.43	.56	.85	1.00

Price per lb. 3.00

6054. **RUBBER—Tubing, heavy wall, black,** same quality as No. 6052.

Approximate weight in ounces, per 12 ft. length, shown below.

Dia. inside, in.	⅛	5/32	3/16	¼	5/16	⅜	½	⅝	¾	1
Wall thickness, inches	1/16	1/16	1/16	3/32	3/32	⅛	⅛	5/32	5/32	3/16
Per 12 ft. lgth., ounces	6	6½	9	14	19	21	40	42	58	73
Price per ft...	.14	.15	.21	.33	.45	.49	.93	.98	1.35	1.70

Price per lb. 3.00

6056. RUBBER—Tubing, heavy wall, black, a less expensive quality.

Approximate weight in ounces per 12 ft. length, shown below.

Diam. inside, inches	1/8	5/32	3/16	1/4	5/16	3/8	1/2
Wall thickness, inches	1/16	1/16	1/64	3/32	3/32	1/8	1/8
Per 12 ft. length, ounces	5½	6	9	9½	16	20	24½
Price per ft.	.09	.10	.14	.15	.25	.31	.38
Price per lb.							2.00

6058. RUBBER—Tubing, light wall, red or antimony.

Approximate weight in ounces per 12 ft. length, shown below.

Dia. inside, in.	1/8	5/32	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1
Per 12 ft. lgth., ounces	2½	3½	4	6	7½	8	15½	17	20½	28
Price per ft.	.07	.10	.12	.18	.21	.24	.45	.50	.60	.80
Price per lb.										3.60

6060. RUBBER—Tubing, heavy wall, red.

Approximate weight in ounces per 12 ft. length, shown below.

Dia. inside, in.	1/8	5/32	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1
Per 12 ft. lgth., ounces	4	4½	5	11	13½	15	24	29	33	38½
Price per ft.	.11	.13	.14	.31	.38	.42	.68	.82	.94	1.10
Price per lb.										3.60

6062. RUBBER—Tubing, heavy wall, red, a less expensive quality.

Approximate weight in ounces per 12 ft. length, shown below.

Diam. inside, inches	1/8	5/32	3/16	1/4	5/16	3/8	1/2
Wall thickness, inches	1/16	1/16	1/64	3/32	3/32	1/8	1/8
Per 12 ft. length, ounces	4½	5	8	9	17	27	29
Price per ft.	.07	.08	.13	.15	.27	.43	.46
Price per lb.							2.00

6064. RUBBER—Tubing, for Gooch crucibles, black, pure gum, very thin wall.

Width outside when flat, inches	1¼	1½	1¾
Price per foot	.20	.25	.30
Price per 12 feet	2.00	2.40	3.00

6066. RUBBER—Tubing, Pressure, extra heavy black, for vacuum pump connections, etc.

Approximate weight in ounces per 12 ft. length, shown below.

Diam. inside, inches	1/8	3/16	1/4	5/16	3/8	1/2	
Wall thickness, inches	3/16	3/16	3/16	3/16	1/4	1/4	
Per 12 ft. length, ounces	19	19	34	37½	69	96½	
Price per foot	.33	.33	.58	.65	1.18	1.65	
Price per lb.							2.20

6068. RUBBER—Tubing, Pressure, with canvas insertion, for vacuum pump connections, etc.

Approximate weight in ounces per 12 ft. length, shown below.

Diam. inside, inches	1/8	3/16	1/4	5/16	3/8	1/2	
Wall thickness, inches	1/8	3/16	3/16	1/4	1/4	1/4	
Per 12 ft. length, ounces	24	26	30	40	42	78	
Price per foot	.41	.45	.52	.69	.72	1.35	
Price per lb.							2.20

6070

6072

6074

6070. **TUBING—Brass, flexible,** more durable than rubber tubing, as it will not burn or blister, and is unaffected by atmospheric conditions. Each length is furnished with heavy rubber push-on connections at both ends.

Approximate weight per dozen feet, in inches.

Length, inches	24	24	36	36
Diameter, inches	¼	5/16	¼	5/16
Each	.95	1.40	1.30	1.90

6072. **RUBBER—Tubing Rack,** of Russian iron; most useful, as it prevents rubber tubing from, kinking 3.00

6074. **RUBBER—Tubing Stretcher.** Facilitates attaching rubber tubing to connection tubes, etc. 1.75

RUHMKORFF COILS—see No. 4100.

RULES—see **Measures.**

6078

6082

6084

SAMPLE BAGS—See Paper Bags.

6078. **SAMPLING—Pan,** of seamless tin, deep; for ore.

Diameter, inches	5	6	7	8½	10
Each	.10	.12	.15	.18	.25

6079. **SAMPLING—Pan,** same as No. 6078, but enamelled.

Diameter, inches	6	7	8½	10
Each	.35	.45	.55	.70

SAMPLING—Pans, of Russian sheet iron, shallow form, see No. 620.

6082. **SAMPLING—Shovel,** with handle, size 10x10 inches 8.00

6084. **SAMPLING—Tray,** of tin, with divisions.

Size, inches	5½x8	9x12
Each	1.60	2.20

6086

6086. **SAMPLER—Jones,** facilitates quick and uniform sampling. It consists of a hopper, set in a 4 legged support, scoop and 4 sampling pans and brush. All parts can be easily cleaned.

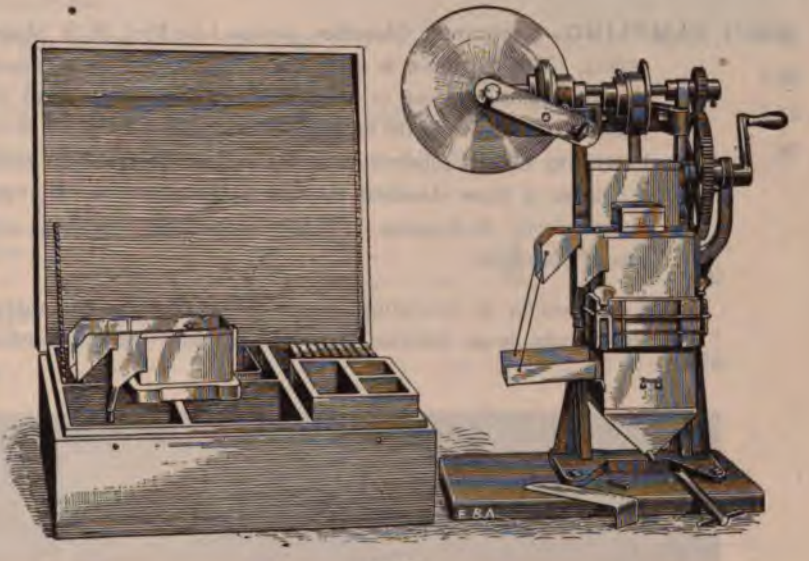
Size, inches	4x4	6x6	10x10
Trays, inches	½	½	¾
Each	**15.75**	**21.00**	**30.00**

6086/1. **Ditto—Improved Form.**

Size, inches	4x4	6x6	8x10
Trays, inches	½	½	¾
Each	**16.25**	**22.75**	**31.50**

6086a. **Brushes**—only for above samplers...**each** **.40**

6088



6092

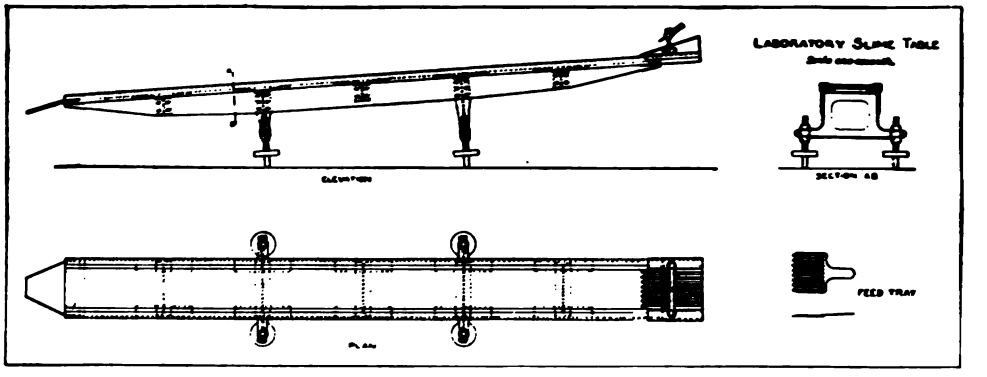
6088. **SAMPLER—Umpire Ore,** insures an accurate and impartial sample. It consists of a hopper mounted on support, with each bucket divided into four parts, two closed and two open. The sample is halved in the upper bucket and again in the lower, allowing one quarter of the original to fall into the receptacle. Refeeding the quarter obtained gives $\frac{1}{16}$th of the original sample, and so on, by refeeding. All parts easily accessible for cleaning; for hand power **65.00**

6092. **SAMPLING—Vezin Jig,** designed by Prof. H. S. Munroe of Columbia University. This is a very useful apparatus for treating fine and coarse sands and meal in the assay. Directions are furnished with each complete apparatus, which consists of the jig itself, assorted sieves and a container for them. For hand or power operation

price on application

6094. **SAMPLING—Slime Table,** designed by Prof. H. S. Munroe of Columbia University. This apparatus is to supplement the work of the Vezin Laboratory Jig for treating slimes. It consists of a table, made of a strong metallic frame about five feet long, in which a specially ground glass plate is securely held. In place of the glass plate, flat plates of pine, maple, slate or other material may be secured. The glass plate is removable, and held in position by springs. Directions written by Prof. Henry S. Munroe are furnished with the apparatus. For cut, see next page

price on application



6094

6096/1. SAMPLING—Laboratory Classifier, designed by Prof. H. S. Munroe of Columbia University. This apparatus is used in mining laboratories to prepare samples of crushed ore for jigging, vanning or washing in a batea, or on small laboratory tables. By treating and retreating the contents of the flask, with water currents of increasing velocity, any desired subdivision of the ore may be secured. Instead of one apparatus, a number of these classifiers may be used together, the first with a current of maximum velocity discharging its lighter product into the next, and so on through a series of apparatus.

Size A, diameter of circulating tube, 1 inch; complete with rubber tubing, extra large screw cocks, brass thimbles, directions for use; without bottles

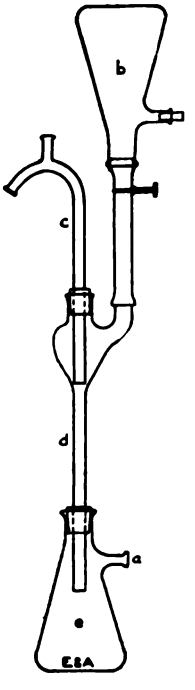
price on application

6098/1. Ditto—Size B, with circulating tube 1½ inch; complete as above

price on application

6100/1. Ditto—Size C, with circulating tube 2 inch; complete as above

price on application



6096/1–6100/1

The difficulty of flow arrest, experienced with other form, has been overcome in the improved design by discarding the funnel, and by connecting the second Erlenmeyer flask directly with the apparatus by a short length of rubber tubing of large diameter. A short brass sleeve inside the rubber tube makes a tight joint within the mouth of the flask, while the lower end of the tube is large enough to slip over the mouth of the bulb tube "d" as shown. A screw pinch-cock permits the flow of sand to be controlled and adjusted.

As the sand flows out of the upper flask water ascends through the connecting tube to take its place. This continuous ascending current keeps the sand loose and tends to promote a uniform feed. The feed is not affected in any way by the density of the column in "c." If the material becomes compact or the feed is choked, water may be pumped into the flask and the flow restored by gently squeezing the rubber tube. By pinching the lower end tightly with the thumb and fingers of one hand, before squeezing it above with the other, the sand may be loosened even when quite solidly packed. To permit this pumping of the water there must be some air in the top of the flask, which can be admitted, if necessary, through the side inlet.

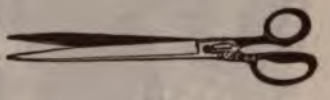
6102

6110

6116

6118

6132


6134

SAND BATHS—See Baths.

6102. **SAND GLASS**—Mounted in polished wooden frames.

For, minutes	1	2	3	5	10	30	45	60
Each	**1.75**	**1.75**	**1.75**	**2.65**	**4.35**	**5.25**	**6.50**	**7.00**

SAND PAPER—See Paper.

6104. **SCISSORS—Flat ends,** for the pocket; 4 inches **1.40**

6106. **Ditto**—5 inches **1.60**

6108. **SCISSORS—Pointed,** for cutting filter paper, etc., 7 inches **1.75**

6110. **SCOOP—Agateware,** 5½x3 inches ..... **.35**

SCOOP—Glass for weighing, see Nos. 440–442.

6116. **SCOOP—Horn,** flat and wide, for mixing.

Size of bowl, inches	4x2¾	3x2⅛	2½x1⅞
Each	**.30**	**.25**	**.20**

6118. **SCOOP—Tinned Iron,** for mixing.

Width of bowl, inches	5¼	7
Each	**1.00**	**1.40**

6124

6124. **SCORIFIER—Denver make.**

Diameter, inches	2	2¼	2½	2¾	3	4
Original barrel contains	2000	2000	1900	1000	1000	700
Per 100	**2.80**	**3.10**	**3.50**	**4.15**	**4.80**	**9.00**

6126. **Ditto—Bartlett form.**

Diameter, inches	2¼	2½	3
Original barrel contains	2000	1900	900
Per 100	**3.10**	**3.50**	**4.80**

SCORIFIER TONGS—See Tongs.

6128. **SCRAPER**—For cleaning muffles, straight or bent **1.00**

6132. **SHEARS—Steel, heavy** (hand shears).

Length, inches	11½	12½	14	16
Each	**3.00**	**3.30**	**4.50**	**5.50**

6134. **SHEARS—For cutting filter paper, etc.**

Length, inches	6	8	10	12
Each	**1.30**	**1.70**	**2.65**	**3.25**

6134/1. **SHEARS**—Similar to 6134, but stronger and shorter blades. Length 7½ inches **1.80**

SELENIUM CELL—see No. 5803.

6135

6143

Shaking Apparatus

6135. **SHAKING APPARATUS—For tubes or bottles.** This machine was primarily designed to carry small bottles, such as are used by health officials for collecting samples of suspected sputum. Sizes are available for taking bottles up to 1000 cc. capacity. In place of the 50 cc. bottles, test tubes up to 5 inches in length may be used, or glass tubes of 50 cc. capacity. It subjects the bottles to a most vigorous shaking, reducing the contents to a fine division; it can be operated at a speed up to 1000 R.P.M. The machine is constructed in a most substantial manner; the combination of journal and ball bearings insures smoothness of operation. After the shaking process, it is often desired to sediment the contents without removal from the tubes or bottles. The Electric Centrifuges (see pages 151–154) are adapted to this purpose. Standard or special 15 cc. and 50 cc. tubes may be used in both the Shaker and Centrifuge, and regular or special trunnion cups may be used in the Centrifuge to carry the sputum-bottles.

	R. P. M.	110 V. D.C.	220 V. D.C.	110 V.A.C. 60 cycles	220 V.A.C. 60 cycles
For 2 bottles—50 cc.	1000	**105.00**	**105.00**	**109.00**	**109.00**
6137. **Ditto**—For 4 bottles—50 cc.	600	**111.00**	**111.00**	**115.00**	**115.00**
6141. **Ditto**—For 4 bottles (taking bottles from 200 cc. up to 1000 cc.)	variable from 1000 to 300	**182.50**	**182.50**	**185.00**	**185.00**

6143. **SHAKING APPARATUS—Rickard, Sputum Bottle Shaker.** This machine is widely employed in the examination of sputum where there are many samples daily, and each sample must be rigorously inspected. It provides for shaking samples in the original collection bottle. Twenty-four bottles can be carried simultaneously, thus providing for a rapid handling of a considerable amount of routine work.

A rapid alternating impact is essential; this is afforded by the speed of the shaker, about 600 R.P.M., which subjects the bottles to a most vigorous shaking. Experience has shown the necessity of very substantial construction of machines of this character. Unbalanced vibratory motion of the amount necessary for the work in hand, demands some means of absorbing the shock of the vibration. This is satisfactorily accomplished in this latest model by the broad, massive and cushioned base.

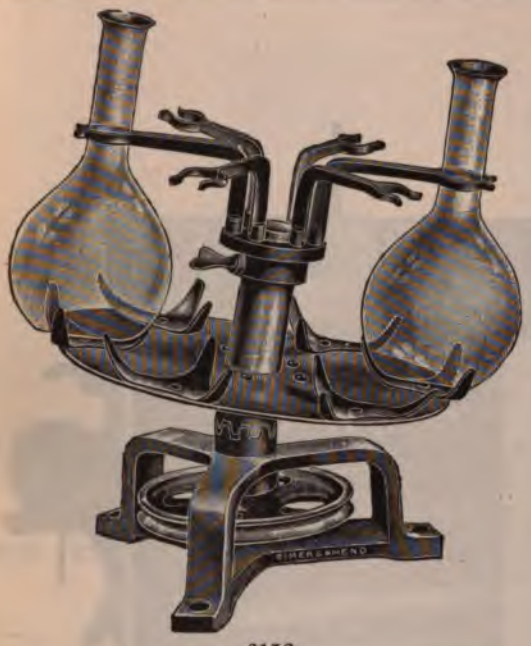
After the emulsifying of the samples by the sputum shaker, it is desirable to sediment the sputum in the same bottle. This may be conveniently done by the electric centrifuge (see pages 151–154) for which special containers are made to carry the sputum bottles.

For 110 volts D. C. **182.50**

6145. **Ditto**—For 110 volts A. C., 60 cycles **185.00**

6147. **Ditto**—For 220 volts D. C. **182.50**

6147/1. **Ditto**—For 220 volts A. C., 60 cycles **185.00**

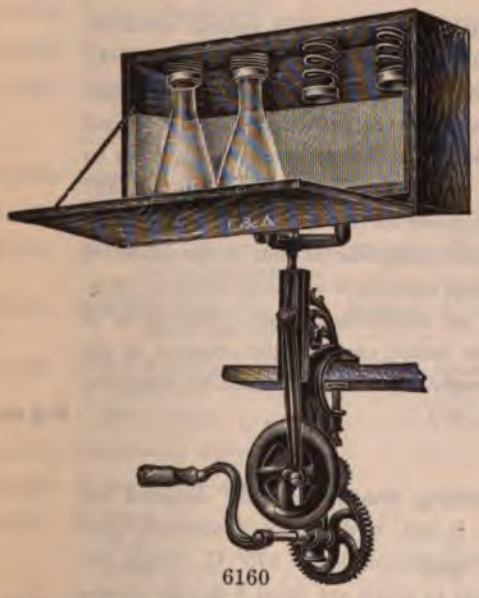


6156

6158

6156. **SHAKING APPARATUS—Camp (Patented),** particularly suited for the rapid precipitation of phosphorus by the molybdic method, and dissolving steels or pig-iron for carbon combustion. Made to hold six flasks from 6 to 24 ounces, either Florence or Erlenmeyer shape. Pulley 6 inches diam.; power required about ⅙ H. P., can be operated by small electric motor with suitable counter-shaft to control speed **50.00**

6158. **Ditto**—with wooden disc and clamps to accommodate 12 volumetric flasks 100 cc., for sugar analysis purposes, etc. **56.00**



6160

6162

6164

6160. **SHAKING APPARATUS—Dudley,** to accommodate 4 Erlenmeyer flasks (12 oz.), complete as illustrated **35.00**

6162. **SHAKING APPARATUS**—Used for milk and similar liquids, noiseless and easy working, being operated by rubber friction gear; with glass cups **17.50**

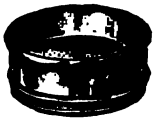
6164. **SHAKING APPARATUS—Rabe,** accommodates one liter bottle; complete as illustrated with water motor **27.50**

6166

6168

6166. **SHAKING APPARATUS—Freas Universal Swirl Platform.** The general construction is the same as the regular Freas Oven, for temperature control up to 175° C. The Oven is fitted with a metal cage, 28″ wide, 14″ deep and 18″ high. This cage is supplied with removable, adjustable shelves which are perforated to allow forced circulation of air. The shelves will carry vessels of several gallons capacity down to an ordinary test tube. The inside dimensions above the Heating element are 32″ wide, 18″ deep by 22″ high. By means of the motor on the back of the Oven and a special mechanical adjustment, the cage is given a swirling motion in the plane of the shelves. This gives the liquid in the various containers a similar motion, keeping it in constant agitation, thus acting as an automatic stirrer. The Oven is equipped with an aluminum fan driven by the motor, enabling the operator to use at will a current of forced warm air which greatly hastens evaporation by removing the moisture laden air 975.00

6168. **SHAKING APPARATUS—Electric, Freas Rotating Shaft,** especially designed for shaking soil samples at constant temperature; it can, however, be successfully employed for other purposes requiring constant temperature below 175° C. Inside the Oven extending from end to end is a metal shaft to which are fitted 5 double adjustable clamps for holding ten wide mouth 12 oz. jars, each supplied with a ground glass stopper. The shaft is rotated by an electric motor, thus subjecting the material which may be placed in the glass stoppered bottles to constant and uniform agitation. The inside dimensions above the heating element are 32″ wide, 14″ deep, 20″ high 530.00



6172

6180
6188

6184
6192

6170. SIEVE—Bolting Cloth, for sieving, etc.; 40 inches wide.

No.	9	10	12	15	19	25
Mesh per lineal inch	97	109	125	150	173	200
Per yard	**7.25**	**7.75**	**9.50**	**11.50**	**21.00**	**27.50**

6172. SIEVE—Wooden frame, brass gauze; best make; diameter 6 inches.

Mesh	10	20	40	60	80	100
Sieve only	**.80**	**.85**	**.90**	**1.00**	**1.25**	**1.70**

6174. Ditto—diameter 8 inches **1.05 1.10 1.15 1.25 1.60 1.90**

6176. Ditto—diameter 12 inches **2.00 2.05 2.10 2.20 2.60 3.15**

6178. SIEVE—Wooden frame, iron gauze. Any diameter and mesh, made only to order at short notice.

6180. SIEVE—Tin plate frame, brass gauze, superior make; diameter 5 inches.

Mesh	20	40	60	80	100	120	150	200
Sieve only	**135**	**1.50**	**1.60**	**1.75**	**2.00**	**3.00**	**4.25**	**5.75**

6180a. Cover—for above ..... **.55**

6180b. Bottom—for above **1.00**

6182. SIEVE—like No. 6180, but 8″ diameter.

Mesh	20	40	60	80	100	120	150	200
Sieve only	**2.10**	**2.20**	**2.30**	**2.40**	**2.55**	**3.80**	**5.25**	**6.80**

6182a. Cover—for above ..... **.55**

6182b. Bottom—for above **1.10**

6184. SIEVES—like No. 6180 **Nested,** 5″ diameter, set of 5, from 20 to 100 mesh; with one cover and bottom **9.60**

6186. SIEVE—like No. 6182, **Nested,** 8″ diameter, set of 5, from 20 to 100 mesh; with one cover and bottom **13.20**

6188. SIEVE—Brass frame, seamless, brass gauze; superior make; diameter 5″.

Mesh	20	40	60	80	100	120	150	200
Sieve only	**1.75**	**1.95**	**2.20**	**2.30**	**2.40**	**3.00**	**4.20**	**7.50**

6188a. Cover—for above **1.20**

6188b. Bottom—for above ..... **.80**

6190. SIEVE—like No. 6188, but 8″.

Mesh	20	40	60	80	100	120	150	200
Sieve only	**2.90**	**3.05**	**3.25**	**3.35**	**3.50**	**5.10**	**6.50**	**10.00**

6190a. Cover—for above **1.20**

6190b. Bottom—for above **1.00**

6192. SIEVES—5″, like No. 6188, **Nested,** set of 5, from 20 to 100 mesh, with one cover and bottom **12.00**

6193. SIEVES—like No. 6190, 8″ **Nested,** set of 5 from 20 to 100 mesh, with one cover and bottom **17.40**

6196/2

6197

6194. **SIEVE—Brass frame, perforated brass plate,** round holes; as used in soil and fertilizer laboratories; diameter 6 inches.

Diameter of holes, mm.	½	1	2
Sieve only	4.00	4.00	4.00

6194a. **Cover**—for above 3.00

6194b. **Bottom**—for above 3.00

6195. **SIEVE**—like No. 6194, but 8″ diameter.

Diameter of holes, mm.	½	1	2
Sieve only	5.00	5.00	5.00

6195a. **Cover**—for above 4.00

6195b. **Bottom**—for above 4.00

6196. **SIEVE**—like No. 6194, but 10″ diameter.

Diameter of holes, mm.	½	1	2
Sieve only	7.20	7.20	7.20

6196a. **Cover**—for above 6.00

6196b. **Bottom**—for above 6.00

6196/1. **SIEVES—Soil, perforated brass plate,** 4 inches diameter; set of 3, with circular holes ½, 1 and 2 mm. diameter; in brass frame with cover and bottom 9.00

6196/2. **SIEVES—Soil, perforated metal,** 120 mm. diameter; set of 7, with circular holes ½, ¾, 1, 1½, 2, 3 and 5 mm. diameter; in brass frame, with cover and bottom 18.00

6196/3. **SIEVES**—set of 5, with holes ½, 1, 2, 3 and 5 mm. diameter; with cover and bottom.. 12.00

6197. **SIEVES—Standard,** brass gauze, tin plate frame, according to **American Society of Civil Engineers;** set of 8, one each 10, 20, 30, 40, 50, 80, 100 and 200 mesh, varying in diameter from 5 to 8½ inches 51.25

6198. **SIEVE—Standard,** brass frame and brass gauze, according to the **American Society for Testing Materials;** diameter 8 inches.

Mesh	10	20	30	40	50
Sieve only	7.50	7.50	7.50	8.00	8.00
Mesh	60	70	80	90	100
Sieve only	8.75	9.00	9.50	9.75	10.00
Mesh	110	120	130	140	150
Sieve only	10.00	10.00	10.00	10.00	10.75
Mesh	160	170	180	190	200
Sieve only	11.25	12.00	12.50	13.00	14.00

6198a. **Cover**—for above 4.00

6198b. **Bottom**—for above 4.00

6200. **SIEVE**—like No. 6198, but 5″ diameter. Same mesh and prices as No. 6198.

6200a. **Cover**—for above; same price as No. 6198a.

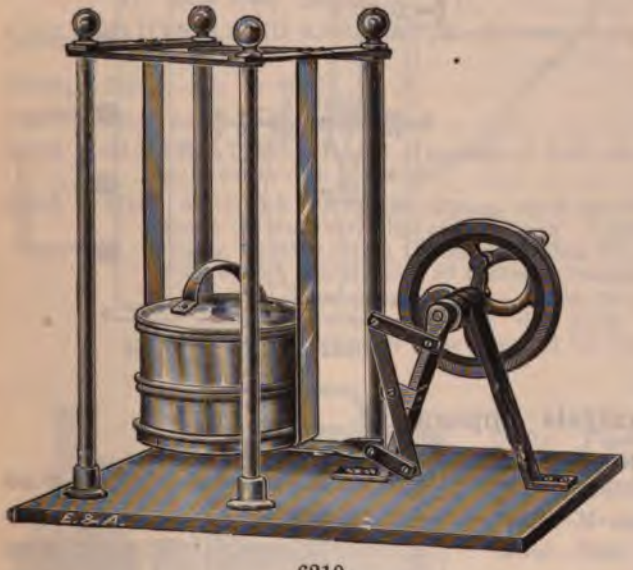
6200b. **Bottom**—for above; same price as No. 6198b.

Closed Open

6209

6209. **SIFTER—Hunter Lightning Sifter and Mixer, No. "00," for hand power.** Galvanized iron bottom and with gearing for operating either sifter or mixer, or both. Capacity 15 lbs.; floor space required: 12 x 18"; weight 28 lbs. With these machines, Druggists can make their own Baking Powder, Face Powder, Tooth Powder and other dry mixtures without the usual accompaniment of dirt, dust and excessive labor. Brushes are adjustable and sieves are interchangeable. Any size mesh can be used, but there is an extra charge for sieves finer than 50 mesh **40.00**

6209/1. **SIFTER**—same as above, but with enamelled bottom **47.50**



6210 6212

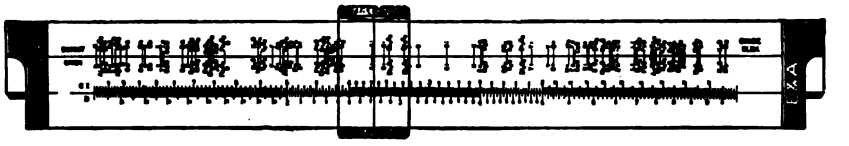
6210. **SIEVE—Shaking Apparatus,** for sieves; adapted for hand or power. Will accommodate from one to four sieves, 8 inch diameter. The shaker is fastened to a finished wood base 11x20 inches; overall height 17 inches; without sieves **43.75**

6212. **SIEVE—"Per Se" Tier Sieve Agitator,** a perfect labor saver, whose mechanical action produces both a semi-rotary and undulatory movement towards acceleration of action; for hand or belt power; without sieves **192.50**

6214. **Ditto**—with 110 volt D. C. Motor **330.00**

6215. **Ditto—with motor for 110 volt A. C.,** single phase, 60 cycle current **385.00**

For currents other than above, give full details of current. If A. C., besides voltage, state number of phases and cycles.



6217 (Front)

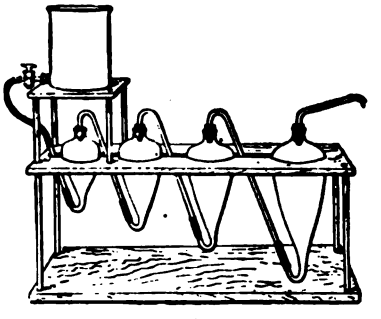
6217. **SLIDE RULE—Duplex, for Chemists,** 10 inches long, divisions on white facings, glass indicator; in morocco covered case with directions **10.00**

This rule represents the successful completion of a long series of experiments to adapt the logarithmic and cologarithmic scales to the rapid solution of the problems encountered by the chemist. Through the adaptation of the Duplex Slide Rule, the solution of the commoner problems has been greatly simplified, while the scope of the rule has been increased by the inclusion of a large number of chemical symbols. Aside from the solution of the chemical problems above referred to, any arithmetical problems solvable by logarithms are readily and accurately done with a minimum number of settings.

The Rule carries 138 chemical symbols which include the common acids, bases, salts, oxides, and elements. As each symbol has its individual position corresponding to the logarithm of its molecular weight, the number of permutations and combinations possible covers the requirements of almost any problem.

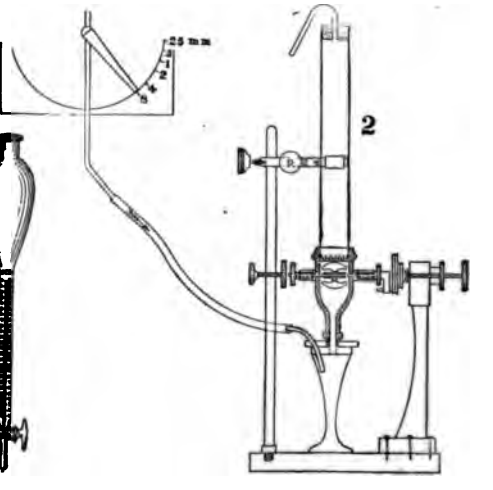
By using the logarithmic and cologarithmic scales in conjunction with the chemical gauge points, problems in Stoichiometry, such as Gravimetric Analysis, Volumetric Analysis, Equivalents, Percentage Composition, Conversion Factors, Volume of gas from a given weight of substance at different temperatures and pressures, and many other analogous problems are readily solved.

The Chemist's Duplex Slide Rule is accompanied by a Manual giving detailed explanation.

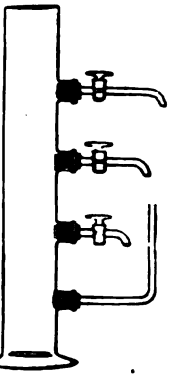


6222

6230



6232



6234

Soil Analysis Apparatus

6222. **ELUTRIATING APPARATUS—Nobel,** with reservoirs, one each ½, 1, 2 and 4 pints; complete on support as illustrated **27.00**

6222a. **Jar**—only for above, with stopcock **5.40**

6222b. **Stand**—only for above **10.00**

6224. **Set of 4 reservoirs**—only, with connections for 6222 ..... **12.00**

6230. **ELUTRIATING APPARATUS**—For separating soils for agricultural analysis **4.50**

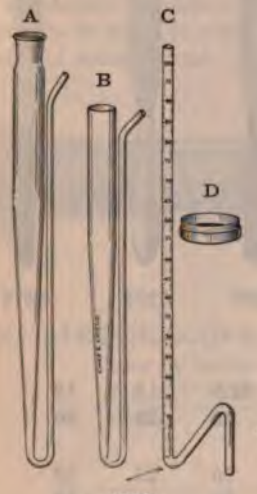
6232. **ELUTRIATING APPARATUS—Hilgard,** of finest construction with stirring arrangement; without dial and connecting tube **80.00**

6232a. **Stand**—for above, without glass parts **70.00**

6233. **Dial and connecting tube**—for 6232 ..... **10.00**

6234. **ELUTRIATING APPARATUS—Knopf,** cylinder 20 inches high, 3¼ inches diameter, with 3 stopcocks **29.00**

6236. **Cylinder**—only for above **12.00**



6238.

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6238. **ELUTRIATING APPARATUS—Schoene,** complete **10.00**
- A. Large washing tube **3.00**
- B. Small washing tube **1.50**
- C. Piezometer, graduated **4.20**
- D. Brass Sieve, polished **1.50**

6240. **ELUTRIATING APPARATUS—Schoene,** complete with metal reservoir and support table **37.50**

6240a. **Stand**—only for 6240 ..... **17.00**

6240b. **Glass parts**—only for 6240 ..... **13.50**

6242. **ELUTRIATING FLASK**—Capacity of bulb about 400 cc., with neck graduated 40 cc. in single cc.'s **2.25**

6243. **SOIL ACIDITY TESTER—Truog,** made according to the specifications of Prof. E. Truog of the University of Wisconsin Consists of a specially designed Alcohol Heater, together with a Graduated Boiling Flask, Brass Measuring Cup, Brass Measuring Spoon, Spatula, and all necessary reagents.

The test is completed in from 10 to 15 minutes, and the presence of acidity is shown by discoloration of the white test paper used; and the degree of acidity by the exact color assumed by the paper as compared with a chart of standard colors furnished. Complete as described, with directions, in hardwood carrying case **25.00**

6243

6243a. **Flask**—for No. 6243, 300 cc. capacity, with mark at 100 cc. **1.25**

6243b. **Measuring Cup**—for No. 6243 ..... **.75**

6243c. **Measuring Spoon**—for reagents ..... **.25**

6243d. **Test Paper**—for No. 6243, 50 sheets in glass vial ..... **.25**

6243e. **Set of Reagents**—sufficient for 50 tests... **1.50**

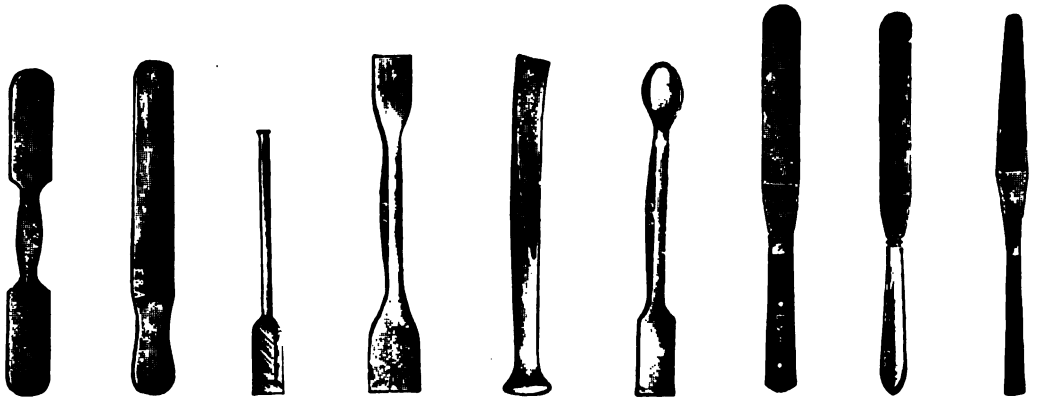
6244. **SOIL BORER—Metal,** for taking samples of soil; 2 meters long.

Diameter, mm.	50	80	105	130	160
Each	price on application				

6244a. Extra length of rod ..... **per meter price on application**

SOIL SIEVES—see **Sieves.**

SOIL THERMOMETERS—see **Thermometers.**



6258 6260 | 6261 | 6262 | 6266 | 6268 | 6270 | 6272 | 6274 | 6276

6258. **SPATULA—Bone,** blade on both ends; best quality.

Length, cm.	12.5	15	18
Each	.20	.25	.30

6260. **SPATULA—Horn,** blade on both ends; best quality.

Length, cm.	10	12½	15	18	20	25	30
Each	.20	.23	.25	.45	.50	.90	1.50

6261. **SPATULA—Horn, with handle,** and wide pliable blade end.

Length, cm.	12.5	15	18
Each	.22	.23	.28

6262. **SPATULA—Glass,** length 15 cm., blade ground on both sides ..... .50

6264. **SPATULA—Nickel solid,** blade on both ends.

Length, cm.	12	15	18	21
Each	2.10	2.20	2.50	2.80

SPATULA—Platinum, see Platinum.

6266. **SPATULA—Porcelain,** blade on both ends.

Length, cm.	14.5	19.5	25	31	36	42
Each	.40	.55	.85	1.10	1.35	2.65

6268. **SPATULA—Porcelain,** heavy, with handle and broad blade.

Length, cm.	14.5	19.5	25	31	36	42
Each	.40	.55	.85	1.10	1.35	2.65

6270. **SPATULA—Porcelain,** with spoon at one end and blade at the other.

Length, cm.	12	14.5	19.5	25	31
Each	.35	.40	.60	.85	1.10

6272. **SPATULA—Steel blade, flexible,** with rivetted wooden handle; best quality.

Length of blade, cm.	7.5	10	12.5	15	20	25	30
Each	.40	.45	.50	.60	.90	1.50	2.50

6274. **SPATULA—Steel blade, flexible, and steel balanced handle** in one piece, nickel plated.

Length of blade, cm.	7.5	10	12.5	15	20	25	30
Each	.65	.70	.85	.95	1.25	2.10	3.85

6276. **SPATULA—Steel blade,** narrow flexible point, with wooden handle.

Length of blade, cm.	7.5	10	15
Each	.45	.60	.80

6279. **SPATULA—Hard Rubber.**

Length of blade, in.	4	6	8
Each	.35	.45	.70

6280. **SOLDERING COPPERS**—Small set complete 1.75

6282. **SOLDERING IRON** .....per lb. 1.50

6284. **SOLDERING IRON HEATER**—For gas..... 2.50

SPECIMEN TUBES—See Tubes.

Spectroscopes

In addition to carrying a stock of the Spectroscopes of American manufacture at present available, we are Agents for Adam Hilger Company, Ltd., and other European manufacturers. Some of their instruments we carry in stock; others, especially the more complicated forms, will be imported to order on receipt of specifications. Descriptive bulletin sent on request.

6286

6286. **SPECTROSCOPE—Hand,** with simple flint prism, angle of 60°. So that the principle may be easily understood, there are no lenses between the slit and the eye. By sliding the inner tube until properly focused, the spectrum lines are very distinctly shown **12.00**

6288

6292

6288. **SPECTROSCOPE—Hand, direct Vision,** with adjustable slit; pocket size; in case.. **18.00**

6290. **Ditto**—but with slit not adjustable; in case **15.00**

6292. **SPECTROSCOPE—Direct Vision,** with adjustable slit, comparison prism and reflecting mirror; pocket size, in case **25.00**

6294. **Ditto—large size;** with objective of longer focus, 6 inches long; in case **30.00**

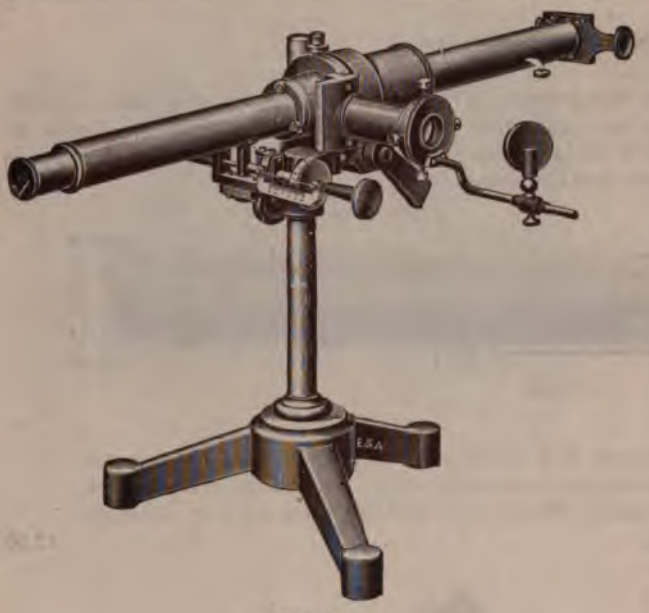
6296

6298–6300

6296. **SPECTROSCOPE—Direct Vision,** same as No. 6292, but with cap for holding test tubes **33.00**

6298. **SPECTROSCOPE—Hand, Direct Vision,** with adjustable slit, comparison prism, graduated scale, reflecting mirror and rotating disc fitted with 6 eyepieces of different focus. This disc, which supersedes the old method of focussing, is rotated until the proper eyepiece is found; in case **70.00**

6300. **Ditto**—with electric illuminating arrangement, including three storage cells; in case **100.00**



6302–06

6313

6302. **SPECTROSCOPE—Hoffman, large model, Direct Vision,** for measuring wave lengths and for chemical analysis. By means of the micrometer screw M, the telescope can be moved across the whole spectrum, thus serving as a measuring device. Complete outfit including slit with swing-out comparison prism, 2 oculars with cross hairs, prism of high dispersion, 12 glass tubes with fused-in platinum wires, two supports for same, one absorption tray; with support and 2 Bunsen burners with chimneys **price on application**

When specially ordered, scale tube with scale S is added.

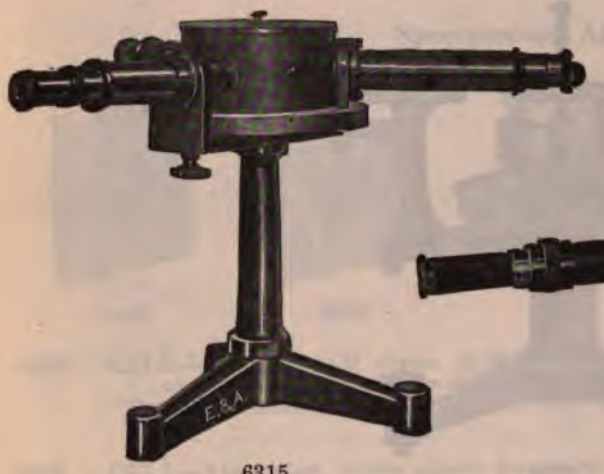
6304. **Scale tube with scale S,** extra ..... **price on application**

6306. **Reflecting mirror,** extra ..... **price on application**

6312. **SPECTROSCOPE—Hoffman, small model,** 9¼ inches long; with reflection prism, micrometer screw for moving telescope across the whole spectrum field and adjustable slit; in case **60.00**

6313. **SPECTROSCOPE—Laboratory.** A spectroscope of standard type, giving a brilliant spectrum of ample length and sharpness for the use of the student in becoming familiar with the solar spectrum, also for observing and charting flame spectra. The collimator and the telescope objectives are of 15 mm. aperture and about 125 mm. focal length. The telescope has focal adjustment and rotation to permit setting on any part of the spectrum. The scale is mounted on a draw tube to permit adjustment to the focus of the telescope. The position of the prism is marked on the prism table, so that it may be readily adjusted, in case it is taken out of the instrument.. **46.20**

6315. **SPECTROSCOPE**—The collimator and telescope objectives of this instrument are 25 mm. aperture and about 200 mm. focal length. The lenses are achromatic and of best quality. The prism is mounted on a prism table with three levelling screws. The telescope rotates about the axis of the instrument by means of a tangent screw, over a sufficient angle to permit ready observation of the entire spectrum. There is a simple draw tube for focusing. The scale is a photographic negative having 16 figured divisions, each divided to tenths. Nine figured divisions are included in the field of view, each having the apparent length of about 12 mm. viewed by the naked eye at a distance of 25 cm. The visible spectrum covers about ten divisions equal to about 40 degrees. An adjustable draw tube permits accurate focusing of the scale. For cut, see next page **88.00**



6315

6321

6317. **SPECTROSCOPE**—Similar to No. 6313, but with 30 mm. objectives and a correspondingly larger prism **110.00**

6319. **SPECTROSCOPE**—With two prisms. This instrument has two 60 degree prisms, giving a spectrum of twice the length obtained with a single prism, and with correspondingly greater resolving power. It is suitable for work requiring a wide separation of the colors and at the same time requiring greater brilliancy than is obtained with a grating. With the camera attachment it is especially suitable for photographing absorption spectra of glasses, solutions, etc. It has 30 mm. objectives of about 250 focal length. The scale tube and adjustments are similar to those on No. 6317 ... **176.00**

6321. **SPECTROMETER**—Student. The circle is of magnalium 13 cm. diameter, fitted with heavy protecting plate. The two opposite verniers read to 1 minute of arc. The observing telescope and prism table have independent motion and tangent screw adjustments. The prism table is of larger diameter, fitted with three leveling screws, and has vertical adjustment. The telescope and collimator have achromatic objectives of 25 mm. aperture and about 200 mm. focal length. The observing telescope is provided with a Gauss eyepiece. The slit is 9 mm. long and fitted with delicate adjusting screw. Finish is durable and elegant. Without prism **100.00**

a. **Comparison Prism**—fitted to slit **9.00**

b. **Grating Holder**—to attach to prism table **4.20**

c. **Delicate Focusing Adjustment**—for telescope **9.60**

6323. **SPECTROMETER—Laboratory,** a high class instrument for use in college and technical laboratories. The telescope and collimator have achromatic objectives of 25 mm. aperture and of about 200 mm. focal length. The telescope is provided with a delicate slow motion for focusing. The eye end of the telescope is of standard size, so as to take eyepiece micrometers or the auto collimating eyepiece. A Gauss eyepiece of 10X power is furnished with the instrument. The slit of the collimator is 10 mm. long. It is opened by a fine adjustment screw, the jaws being closed by a spring only, so that they are not injured by being pressed together too hard when it is closed. They are of nickel silver carefully finished. There is a comparison prism. The telescope and collimator are mounted in trunnions from which they may be easily removed and which are accurately adjusted to make the axes of the telescope and the collimator pass through the axis of the instrument. Vertical adjusting screws to permit the adjustment to a horizontal plane. The prism table has three leveling screws and will take a prism or grating up to 70 mm. in height.

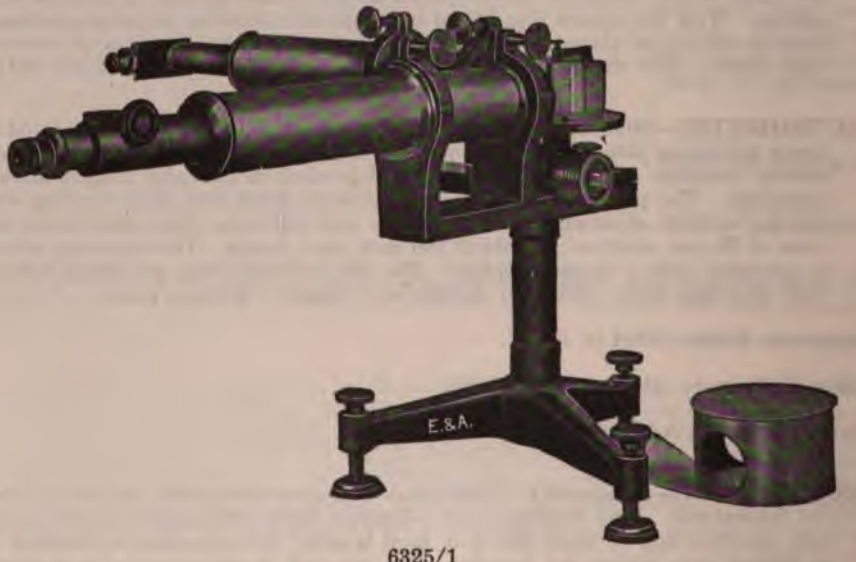
(Continued on next page)

6323

No. 6323—Continued.

The circle, divided on inlaid white celluloid, is 15 cm. in diam. and divided to 20 minutes. The two verniers read to 20 seconds. They are provided with glass covers to protect against dust and with magnifying glasses for reading. The circle rotates with the telescope on a cone bearing; without prism **225.00**

6325. **SPECTROMETER**—As above, except for the objectives of the telescope and collimator which are of 30 mm. aperture and 250 mm. focal length; without prism **250.00**



6325/1

6325/1. **SPECTROSCOPE—Wave Length,** with constant deviation prism. The form of the prism is such that after refraction at the incident surface, the light is reflected internally to the second refracting surface, from which it emerges at an angle of 90 degrees to the incident beam. The prism is equivalent to two 30 degree prisms and one 90 degree reflecting prism. The telescope and collimator are rigidly fixed to the cast iron frame of the instrument at an angle of 90 degrees. The prism table is rotated by means of a fine screw with a hardened steel point, bearing against a hardened steel plate on an arm projecting from the table. The screw carries a helical drum graduated to wave lengths. The objectives of the collimator and the telescope are of 30 mm. aperture and 300 mm. focal length **500.00**

Spectroscope Accessories

6326

6328

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6334

6326. **CELL—Absorption, U shape,** of clearest mirror glass, luted with a burnt-in enamel which resists acids, alkalies and heat.

Dimensions inside, mm.	30x20x5	50x20x4
Each	**1.50**	**2.00**

6328. **CELL—Absorption, bottle shape,** dimensions inside 20x4 mm. **1.50**

6330. **CELL—Absorption, single cell with extended base,** dimensions inside, 55x35x10 mm. **2.00**

6332. **Ditto—Tall form, with lid.**

Dimensions, mm.	100x100x10	120x120x20
Each	**2.50**	**3.75**

6334. **CELL—Absorption, Glass Boxes, with lid.**

Dimensions, mm.	60x30x30	100x30x30	100x40x40
Each	**1.50**	**2.00**	**3.00**

6336

6338

6340

6336. **CELL—Absorption, for volatile liquids;** cylindrical, stoppered; cemented between square glass plates **4.00**

6338. **CELL—Absorption, bottle shape,** stoppered; with parallel walls.

Size of body, mm.	20x20x8	38x38x12
Each	**.80**	**1.20**

6340. **CELL—Absorption, rectangular shape,** polished ends.

Length, cm.	5	10	20
Each	**.80**	**1.00**	**1.20**

6341. **CELL—Adjustable,** clear aperture 15 mm. The thickness of the absorbing layer of liquid can be varied over a range of 10 cm. The inner tube fits snugly within the outer tube, the outer tube being graduated to millimeters. The end plates are of clear glass optically finished **12.00**

6341/1. **Comparison Prism**—for slit. A small total reflecting prism covering one half of the slit when in position **9.00**

6341/2. **Delicate Focusing Adjustment.** A knurled ring, threaded inside, engages threads in the movable tube, allowing a very fine adjustment over a range of about 12 mm. **9.60**

6341/3. **Illuminating Burner**—for scale. A gas burner is mounted adjustably on the instrument, providing convenient illumination either for the scale or the slit **5.40**

6341/4. **Electric Lamp**—for scale. A 15 watt 110 volt tungsten lamp is held by an adjustable support fastened to the instrument. The bulb has a candelabra base and is fitted in a hood to shield the eyes of the observer. Complete with plug for standard socket and five ft. connecting cord **8.40**

6352

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6356

6358–60

6342. **CHART—Spectroscopic,** small, plain ..... **price on application**

6344. **Ditto**—Colored ..... **price on application**

6346. **CHART—Spectroscopic, large,** mounted on linen back, with spectrums K, Rb, Cs, Tl, Na, Li, Ca, Sr, Ba. Size of each spectrum 52 cm. long, 5½ cm. wide **price on application**

6348. **Ditto**—with spectrums In, C, B, Mn, Pb, Cu, Co, Ni, Fe..... **price on application**

6350. **CHART—Spectroscopic, Vogel, astronomical,** colored; set of 2... **price on application**

6351. **CHLORIDES**—Specially purified for Spectroscopic work ..... **price on application**

6352. **SUPPORT—Spectral tube,** for 1 tube; without tube **10.50**

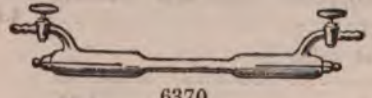
6354. **SUPPORT—Bunsen,** for holding with platinum wire for flame reactions **2.00**

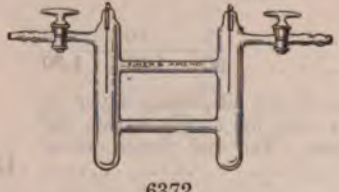
6356. **SUPPORT—Universal, E. & A.,** with brass clamp accommodating any size pocket spectroscope **11.00**

6358. **SUPPORT—Universal,** with mirror, table, universal clamp, absorption cell, absorption tube with screw caps; in case with lock and key ..... **price on application**

6360. **Ditto**—without absorption cell and absorption tube ..... **price on application**

6362


6370


6372

6362. **SPECTRAL TUBE**—filled with gases or vapors of O, H, NO, CO, CO_2, I, Br, Cl, CN, CH_4 and air .**price on application**

6364. **Ditto**—filled with Argon and Helium **price on application**

6366. **Ditto**—filled with Neon and Krypton **price on application**

6368. **Ditto**—filled with Xenon **price on application**

6370. **SPECTRAL TUBE—Glass,** with 2 stopcocks for filling ..... **price on application**

6372. **SPECTRAL TUBE**—For longitudinal observations of the electric spark; with 2 stopcocks ..... **price on application**

6374. **Ditto**—filled with gases or vapors as under No. 6362 ..... **price on application**

6375. **SPECTRAL TUBE—Empty,** with two stopcocks and electrodes **6.00**

6375/1. **SPECTRAL TUBE**—without stopcocks, containing Na, Th, Cd or Hg. Must be heated to vaporize the metal **4.80**

6375/1a. **Heat Box**—for above **2.00**

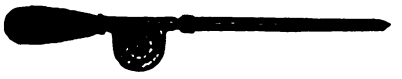
6375/2. **SPECTRAL TUBE—H Form.** The light comes from the end of the glowing column of vapor. Containing Na, Th, Cd or Hg. Must be heated to vaporize the metal.. **6.60**

6375/2a. **Heat Box**—for above **3.00**

6375/5. **DIFFRACTION GRATING—Replica,** 3940 lines per cm. ruling 25 x 25 mm. ... **8.40**

6375/6. **Ditto**—similar to above, but 5900 lines per cm. **8.40**

6375/7. **Ditto**—10,000 lines per cm. **16.80**



6376

6376. **SPEED INDICATOR** — For centrifugal machines, motors, etc., accurate and well made **2.00**

6378. **SPONGES—Laboratory,** for cleaning....per lb. **1.50**

6380. **Ditto—Sheepwool,** 6 to 8 pieces to the lb...each **2.75**

6386

6388

6390

6386. **SPOON—Horn,** superior quality.

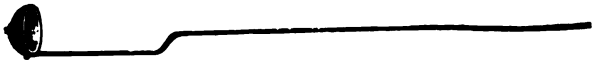
Length, cm.	10	12.5	15	20	25	30
Each	.19	.20	.30	.42	.60	1.50

6388. **SPOON—Horn, with spatula end;** best quality.

Length, cm.	12.5	15	20	26	30
Each	.28	.33	.52	1.00	1.50

6390. **SPOON—Horn, double;** large spoon at one end, small spoon on the other.

Length, cm.	12.5	15	20	26
Each	.35	.42	.55	1.20



6392

6396

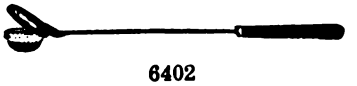
6392. **SPOON—Combustion or Deflagrating; of iron,** for burning phosphorus in oxygen.

Diameter of bowl, mm.	13	25
Dozen	1.40	1.90

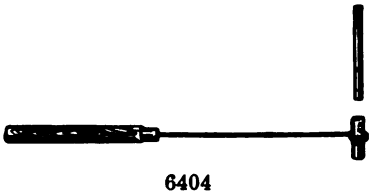
6394. **Ditto—of brass,** dozen **2.00** **2.80**

6396. **SPOON—Glass,** heavy cut.

Size	Tea	Dessert	Table
Each	.50	.80	1.20



6402



6404

6398. **SPOON—Solid Nickel,** spoon at each end.

Length, cm.	12.5	15	21
Each	2.50	2.65	3.25

6400. **SPOON—Solid Nickel,** spatula at one end.

Length, cm.	12.5	15	21
Each	2.50	2.65	3.25

SPOON—Platinum, see Platinum.

6402. **SPOON—Sodium,** of wire gauze, with cover and handle **1.10**

6404. **SPOON—Sodium,** with ramrod ..... **.75**

SPOONS—Blowpipe, see Blowpipe Apparatus.

SPUTUM APPARATUS—see Bacteriological Catalog.

STAINING DISHES AND JARS—see Dishes and Jars, also Bacteriological Catalog.

6406

6408

6410

6412

6414

6414/1

6406. **STEAM SUPERHEATER**—Of iron, 6 inch diameter; with coil gas burner and clay filled cover **23.00**

6408. **STIRRER—Gattermann,** of glass with pulley.

Length of paddles, cm.	2	6
Each	2.20	3.30

6410. **STIRRER—Witt,** improved; of glass, open on the upper end; especially adapted for liquids which float on the top; with pulley **2.20**

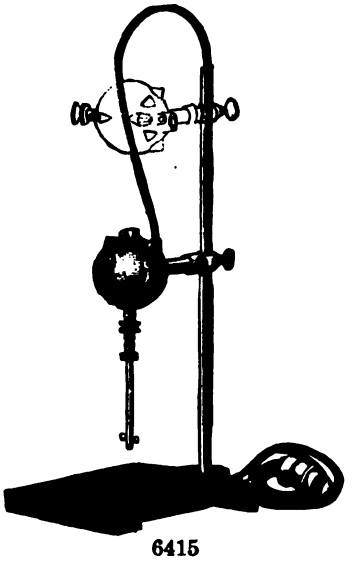
6412. **STIRRER—Witt,** of glass, with pulley **2.20**

6414. **STIRRER—Priesemuth,** of glass, with 5 oblique paddles, with pulley **3.00**

6414/1. **STIRRING APPARATUS**—with chuck, for single glass rods of various forms of stirrers **7.00**

Gramercy Electric Stirrer

This excellently designed apparatus will be found useful for a number of purposes besides general stirring. The motor is fitted with a pulley wheel, which can be brought to a vertical position by a turn of the adjustable extension clamp attaching the motor to the support and allowing the motor to be raised or lowered, as may be desired.

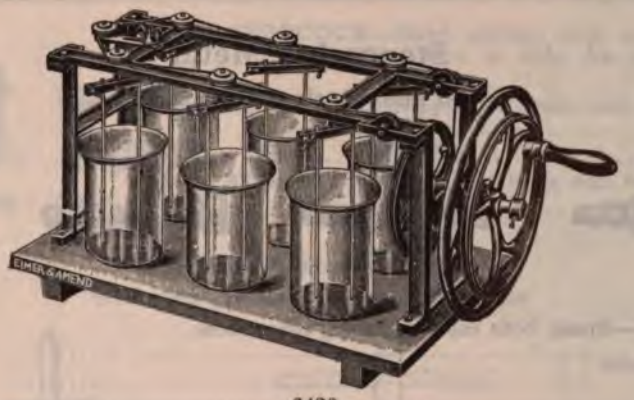


6415

The removable attachment holding the stirring rod is provided with a union fitting, which firmly holds the stirrer and allows it to be quickly and easily removed. The Universal Motor, 1/16 H. P., which can be operated on either D. C. or A. C., is fully enclosed with an aluminum cover, to prevent dust or particles from getting to the working parts. It is attached to the support by means of an adjustable extension clamp. The heavy iron support, with base 16 cm. x 25 cm., is fitted with a hollow upright through which pass the wires from the rheostat to the motor, which, above the rod, are sheathed in flexible metallic tubing. A rheostat, having ten steps, is cast in the base of the support.

6415. **STIRRER—Gramercy Electric,** complete with connecting cord and plug, as illustrated; 110 volt **37.50**

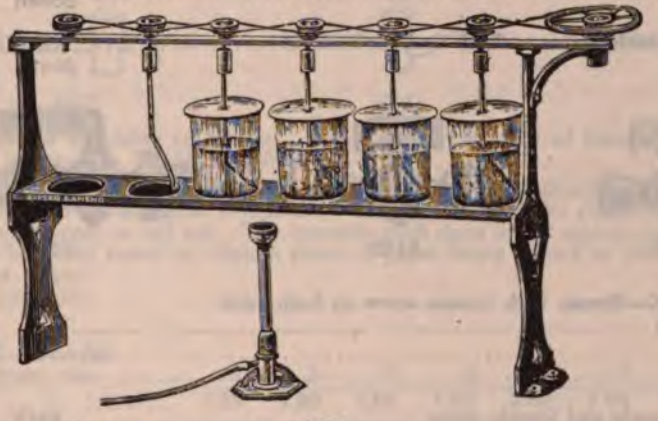
6415/1. **Ditto—220 volt** **40.00**



6420

6420. **STIRRING APPARATUS—E. & A.,** for hand or power; on heavy wooden base and iron supports. Complete, on stand with stirring rods and beakers, as illustrated. For 6 beakers **50.00**

6422. **Ditto**—for 8 beakers **55.00**



6424

6424. **STIRRING APPARATUS—Blair,** for iron analysis; complete with stirrers, asbestos, 6 beakers and covers **40.00**

6426–28

6430

6426. **STIRRING APPARATUS—Rabe,** complete on stand, without water motor **16.00**

6428. **Ditto**—with water motor **26.00**

STIRRING RODS—See No. 3728.

6430. **STENCIL—Novic,** a flexible transparent plate, with "cut outs" of flasks, etc.; very useful, enabling students to make good drawings in their laboratory note b **.15**

Stopcocks—Metal

Well finished, air and gas tight

6432

6434

6436

6438

6432. **STOPCOCK—Brass,** both ends for tubing connections.

Bore, inch	⅛	¼
Each	1.10	1.55
Dozen	11.60	16.80

6434 **STOPCOCK—Brass,** with male screw and tubing attachment .....each 1.10 1.55
dozen 11.60 16.80

6436. **Ditto**—with female screw and tubing attachment .....each 1.10 1.55
dozen 11.60 16.80

6438. **Ditto**—with male screw at both ends .....each 1.10 1.55
dozen 11.60 16.80

6440

6442

6444

6440. **STOPCOCK—Brass,** with female screw at both ends.

Bore, inch	⅛	¼
Each	1.10	1.55
Dozen	11.60	16.80

6442. **Ditto**—with male and female screw .....each 1.10 1.55
dozen 11.60 16.80

6444. **STOPCOCK—Brass, for gas,** nickel plated. The connection is 2½ inches long, tapered from ¼ inch at the small end to ⅝ inch at the valve. It is designed with 12 serrations, making it easy to slip on ¼ to ½ inch rubber tubing, which will not slip off accidentally 1.40

6446

6448

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6452

6446. **STOPCOCK—Brass, for gas,** male screw and tubing attachment.

Bore, inch	⅜	½
Each	1.50	1.80

6448. **Ditto—for gas,** female screw and tubing attachment .....each 1.50 1.80

6450. **STOPCOCK—Brass, for gas,** male and female screw, and tubing attachment 2.40

6452. **STOPCOCK—Brass, for gas,** with quadrant and pointer to regulate the gas supply.

Bore, inch	⅜	½
Each	3.35	3.60

6458

6460

6462

6458. **STOPCOCK—Hard rubber,** each end for rubber connection; bore ⅛ inch; for use with H_2S each .40

6460. **STOPCOCK—Nipples,** of brass, with male thread.

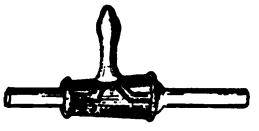
Bore, inch	⅛	¼
Each	.35	.40

6462. **STOPCOCK—Nipples,** of brass, with female thread ..... each .35 .40

Stopcocks—Glass

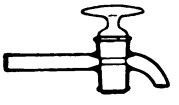
With well ground stoppers—Best make

6464


6466

6468

6470


6472

6474

6476

6464. **STOPCOCK**—for attaching to burette. Please specify capacity of burette when ordering, i.e., whether 10, 25, 50 or 100 cc. 1.20

6466. **STOPCOCK—E. & A., Patented.** The socket or shell of the stopcock is movable, which has the distinct advantage in comparison with ordinary Geissler stopcocks, that there is no loose stopper to fall out. The movable shell stays firmly seated, turns smoothly and can be easily raised to allow a piece of paper being placed to prevent sticking when not in use.

Bore of stopper, mm.	2	4
Each	2.20	2.50

6468. **STOPCOCK—Geissler.**

Bore of stopper, mm.	1	2	3	4	5	6	8	10
Each	1.25	1.30	1.50	1.65	2.20	2.50	3.50	5.00

6470. **STOPCOCK**—with capillary tube 6–7 mm. outside diameter; for gas analysis connections, etc., 1½ mm. bore 1.65

6472. **STOPCOCK—Geissler,** similar to No. 6468, but bent, for aspirator bottles, etc.

Bore of stopper, mm.	2	3	4	5	10
Each	1.70	2.10	2.35	2.85	6.00

6474. **STOPCOCK**—With oblique bored stopper, making it perfectly tight.

Bore of stopper, mm.	2	4
Each	1.80	2.60

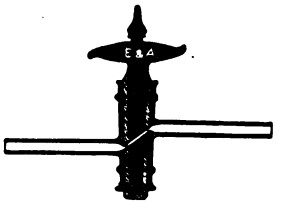
6476. **STOPCOCK**—like No. 6474, but with capillary tube, 1½ mm. bore 2.00

6478/1. **STOPCOCK—E. & A. (Patented),** with oblique bored stopper and **mercury seal. Improved Form.**

Bore of stopper, mm.	2	4
Each	7.50	9.00

6478/2. **STOPCOCK**—like No. 6478/1, but with capillary tube, 2 mm. bore 8.25

6478/1

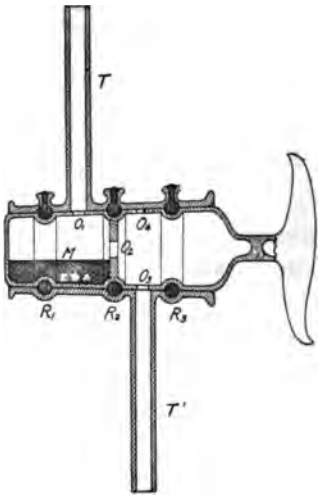


6479

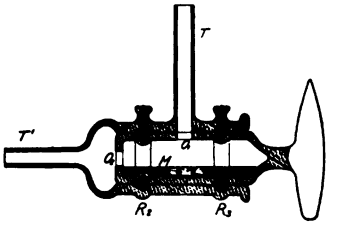
6479. **STOPCOCK — EANDA** Mercury sealed (patented). For use in various positions without danger of spilling mercury. Oblique bored stopper, so constructed that the rate of flow through stopcock can be regulated to a nicety. Many other exclusive features.

Bore of stopper, mm.	2	4
Each	16.00	20.00

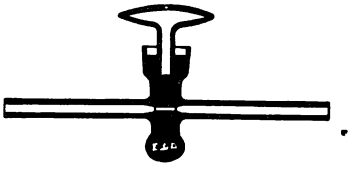
6479/1. **STOPCOCK—like No. 6479,** with capillary tube,



6481



6481/1



6481/2

6481. **STOPCOCK—Vacuum, Failla,** Patent Applied for, Internal **Mercury** Seal, straight.

Bore of plug, mm.	4	10
Each	**20.00**	**27.50**

6481/1. **STOPCOCK—Vacuum, Failla,** Patent Applied for, Internal **Mercury** Seal, Angle.

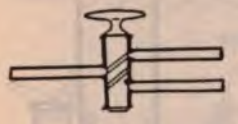
Bore of plug, mm.	4	10
Each	**15.00**	**22.50**

6481/2. **STOPCOCK—Vacuum,** Patented, Balanced **Mercury** Seal, Straight, for Mercury Pumps, 4 mm. bore **9.00**

THE FAILLA INTERNAL SEAL VACUUM STOPCOCK is specially designed to operate without grease, and provided with a means for effectively sealing one side tube from the other against internal leakage.

This stopcock was developed by Mr. G. Failla for use in a radium emanation apparatus. No. 6481 illustrates one form of the stopcock. In the position shown there is a free passage from tube T to T' through the openings O_1, O_2, and O_3. Mercury rings R_1 and R_3 prevent the leakage of air into tubes T and T'. In the closed position, opening O_1 comes under mercury M, and openings O_3 and O_4 interchange positions. When atmospheric air is allowed in tube T' leakage to tube T is prevented by mercury M and ring R_2. Ring R_2 prevents leakage of gas from T' to T between the ground surfaces of the stopper and frame. Mercury M, which covers opening O_1 in the closed position of stopper, prevents the passage of gas from inside the stopper through O_1 to T along the surface of contact of the stopper and frame. It will be noted that there is no way in which gas can reach tube T without crossing a mercury barrier. In a stopcock that is properly made, these barriers block the passage of gas very effectively. For leakage of gas from T to T' the mercury seal M is not effective, for the gas can bubble through it if its pressure is greater than the depth of the mercury.

No. 6481/1 shows another form of this stopcock. The model for use with both tubes T and T' in a horizontal position and other forms for special purposes are not shown, but can be made to order. In the horizontal type the mercury seal is effective in either direction.


6482

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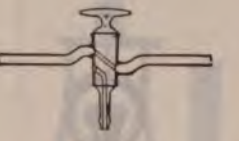

6490

6482. **STOPCOCK—Three way.**

Bore of stopper, mm.	2	4
Each	2.50	3.50

6484. **STOPCOCK**—like No. 6482, but with capillary tube, 1½ mm. bore **2.75**

6487. **STOPCOCK—Three way,** like No. 6482, but **with mercury seal. E. & A. Improved Form** (Patented).

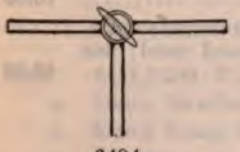
Bore of stopper, mm.	2	4
Each	10.00	12.00

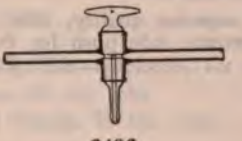
6487/1. **STOPCOCK**—like No. 6487, but with capillary tube, 2 mm. bore **11.00**

6490. **STOPCOCK—Three way, with downward inlet.**

Bore of stopper, mm.	2	4
Each	2.65	3.65

6492. **STOPCOCK**—like No. 6490, but with capillary tube, 1½ mm. bore **3.00**


6494


6496

6498

6500

6494. **STOPCOCK—Geissler, three way.**

Bore of stopper, mm.	2	4
Each	2.20	3.00

6495. **STOPCOCK**—like No. 6494, but with capillary tube, 1½ mm. bore **2.75**

6496. **STOPCOCK**—with downward inlet.

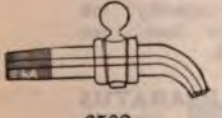
Bore of stopper, mm.	2	4
Each	2.50	3.25

6497. **STOPCOCK**—like No. 6496, but with capillary tube, 1½ mm. bore **3.00**

6498. **STOPCOCK**—with downward inlet and with rubber connection below stopper.

Bore of stopper, mm.	2	4
Each	2.50	3.25

6500. **STOPCOCK—Four way,** each **2.75 3.60**


6502

6504

6506

6508

6502. **STOPCOCK—Heavy glass,** with bib.

Bore of stopper, mm.	3	5	8	10
Each	2.00	3.00	4.00	5.50

6504. **STOPCOCK—Stoneware,** acid proof.

Bore of stopper, inches	⅜	½	¾	1	1¼	1½
Each	4.00	4.50	4.75	6.60	7.00	8.50

6506. **STOPCOCK—Stoneware,** with two male threads.

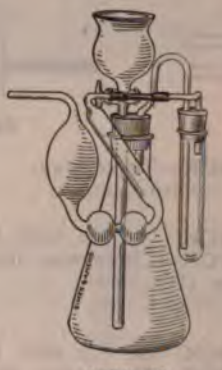
Bore of stopper, in.	⅜	½	¾	1	1¼	1½	2	2½	3
Each	4.00	4.50	4.75	6.60	7.00	8.50	12.00	16.50	24.50

6508. **STOPCOCK—Stoneware**—with one male thread and bib. Each **4.00 4.50 4.75 6.60 7.00 8.50 12.0**

6512

6514

6518


6520–22

6526

6510. **STOPCOCK GREASE**—For lubricating glass stopcocks and other ground surfaces; prevents leaking, jamming and freezing .....**per stick** **.30**

6512. **STOPWATCH**—For use with viscosimeters, etc.; fifth second, 30 minute register; start, stop and fly-back from crown; in nickel case **10.00**

6513. **STOPWATCH—Chemist's Special,** of superior quality, fifth second, 30 minute register; start, stop and fly-back from crown; side push for the split-second hand; fine nickel lever movement; 15 jewels **40.00**

Storage tanks—see Nos. 1114–1116.

Stoves—see Burners.

Straw Rings—see No. 6018.

Suberite Rings—see No. 6020

Streak Plates—see Plates.

6514. **SULFUR APPARATUS—Dudley,** for determination of sulfur in iron, by bromine; complete as illustrated **17.20**

6516. **Glass Parts**—only for above **15.00**

6518. **SULFUR APPARATUS—Finkner,** for the determination of sulfur in iron **9.00**

6520. **SULFUR APPARATUS—Norris,** for the determination of sulfur in iron and steel; complete as illustrated **4.00**

6522. **Sulfur bulb**—only for above ..... **.60**

SULFUR APPARATUS—Pennock and Martin (see Jour. Am. Chem. Soc., Dec., 1903, p. 1265), for the rapid and accurate determination of sulfur in coal and coke; crucible of solid nickel, 40 cc. capacity; on aluminum base; see No. 2374.

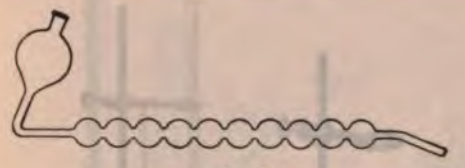
6527

6526. **SULFUR APPARATUS—Wiborgh,** for the exact colorimetric determination of sulfur in iron; glass parts with ring and clamp. **15.00**

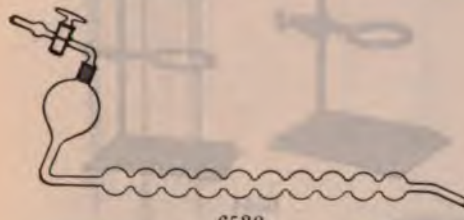
a. **Normal Color Scale**—with percentage table **7.50**

b. **Prepared Linens**—ready for use .....**per 100** **3.25**

6527. **SULFUR APPARATUS—Kelly,** for determining sulfur by the evolution method, complete as illustrated... **5.25**



6528



6530

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6528. **SULFUR APPARATUS—Meyer bulb tubes,** for determination of sulfur in iron, by bromine; with 10 bulbs **1.60**

6530. **Ditto—with stopcock** **3.75**

6531. **SULFUR APPARATUS—For determining sulfur in oils ***—used by many oil refiners; set of three glass parts with wooden base **3.00**

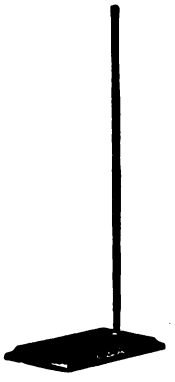
6531/1. **Ditto**—without wooden base **2.50**

6532. **SULFUR TURBIDIMETER—Jackson,** for determining sulfates **18.00**
- a. **Extra Graduated Tubes**—25 cm. long ..... each **3.00**
- b. **Extra Long Graduated Tubes,** 75 cm. long ..... each **6.00**
- c. **Candles** ..... dozen **2.60**

6534

6534. **SULFUR PHOTOMETER—Parr,** especially for determining sulfur in coal, coke, petroleum, etc., by dissolving the fused mass (from the determination of the heat units with Parr Calorimeter) in water, precipitating with Barium Chloride, and noting the depth of the liquid in the graduated tube at which the light from the flame disappears. Complete as illustrated; with pipette, 2 beakers, and bottle of special barium chloride **40.00**

***Apparatus for determining sulfur in illuminating gases and burning oils:** see Nos. 3550–3



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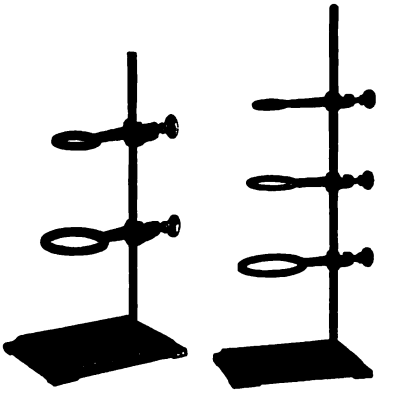
6542



6544

Supports

Our supports are all of the latest designs, very substantial and well finished. For Clamps to go with these Supports, see Clamps; for Iron Rings, see Rings.

6540. **SUPPORT—Iron, rectangular base,** with steel rod; for use with clamps, rings, etc.

Size	small	medium	large	extra heavy
Length of rod, inches	12	20	36	36
Diameter of rod, inches	5/16	3/8	7/16	9/16
Size of base, inches	6x4½	7½x5½	9x6½	9x6½
Each	.40	.60	1.10	1.50

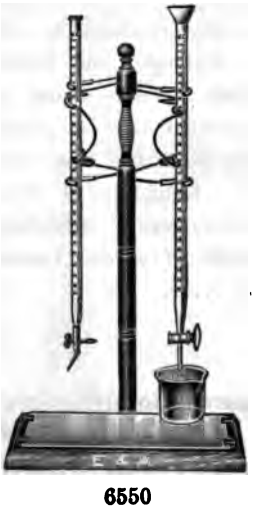
6542. **SUPPORT—Iron, triangular base,** with steel rod.

Size	small	medium	large	extra heavy
Length of rod, inches	12	20	36	36
Each	.40	.60	1.10	1.50

6544. **SUPPORT—Iron, rectangular base, with set of iron rings.**

Size	small	medium	large	extra heavy
Number of rings	2	3	4	4
Size of rings, inside diameter, inches	1¼.2	1¼.2&3	2.3.4&5	2.3.4&5
Each	.80	1.25	2.25	2.65

6546. **SUPPORT—Iron, triangular base, with set of iron rings,** sizes and prices same as No. 6544.



6550

6548. **SUPPORT—Burette, Chaddock.** A most desirable and popular support. The clamp of wire is very simple and perfect in action. The rubber covered V-shaped jaws which hold the burette firm and true are opened by a slight pressure of the thumb; hardwood base fitted with square milk glass base; japanned spring wire clamp and maple rod; for one burette 2.00

6548a. **Milk Glass Plate—for No. 6548** ..... .50

6550. **SUPPORT—like No. 6548, for 2 burettes...** 2.75

6550a. **Milk Glass Plate—for No. 6550** ..... .75

6552. **SUPPORT—like No. 6548, for 3 burettes...** 4.00

6552a. **Milk Glass Plate—for No. 6552** ..... .75

6554. **SUPPORT—similar to No. 6548, for 3 burettes, revolving** 5.00

6554a. **Milk Glass Plate—for No. 6554** ..... .75

6556

6560

6562

6556. **SUPPORT—Burette, Allihn,** with solid porcelain base, brass rod, nickel plated, and double automatic spring clamp, which instantly releases or firmly clamps the burette **10.00**

a. **Clamp**—only **3.85**

b. **Rod**—only **1.25**

c. **Porcelain Base**—only **6.00**

6558. **SUPPORT—Burette, Hoffman,** iron base; with clamp, No. 2028, for two burettes ... **1.50**

6560. **SUPPORT—Burette,** wooden base, steel rod and iron clamp; for two burettes **1.75**

6562. **SUPPORT—Burette, Tuttle,** of finely polished hardwood, with clamping device of brass, for fastening firmly to the shelf. The universal joint allows the burette to be easily and quickly adjusted to a vertical position. The spring clamps hold the burette firmly, which can be instantly removed. When the support is not in use, it may be raised to an upright position over the shelf, a turn of the lever clamping it fast at any angle. For two burettes **5.50**

6564

6566

6568

6572

6564. **SUPPORT—Burette,** of wood; with cork lined clamp; for one burette **1.70**

6566. **SUPPORT**—as above, with extra arm to keep burette steady **2.00**

6568. **SUPPORT—Burette,** of wood; with cork lined clamp; for two burettes **2.20**

6570. **SUPPORT**—as above, with extra arm, to keep burette steady **2.60**

6572. **SUPPORT—Burette and Funnel combined,** of wood; with cork lined cla **2.00**

6574

6576

6580

6582

6588

6574. **SUPPORT—Burette,** wooden base, with adjustable steel rod and metal clamp; for 4 burettes **9.00**

6576. **SUPPORT—Burette, Revolving,** of wood; for 8 burettes or pipettes **5.00**

6578. **Ditto**—with porcelain base **10.00**

For other burette clamps for use with retort stands, see **Clamps.**

6580. **SUPPORT—Condenser, Bunsen,** of brass; with horizontal and vertical movements.... **5.00**

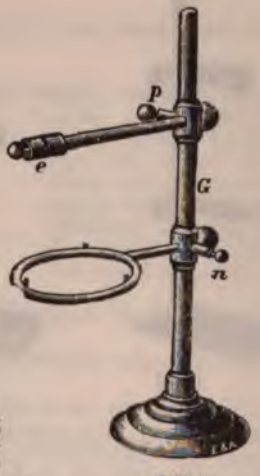
6582. **SUPPORT—Condenser, Bunsen,** of iron; height adjustable; with universal clamp **6.60**

6588. **SUPPORT—Condenser, Bunsen-Hofmann,** of iron; height adjustable; for condensers of various sizes **5.75**

6592

6592. **SUPPORT—Crucible,** for supporting regular 25 cc. Gooch crucibles in a desiccator; of brass with handle.

For desiccator, dia., in..	5	6	8
Each	**3.50**	**3.75**	**4.00**



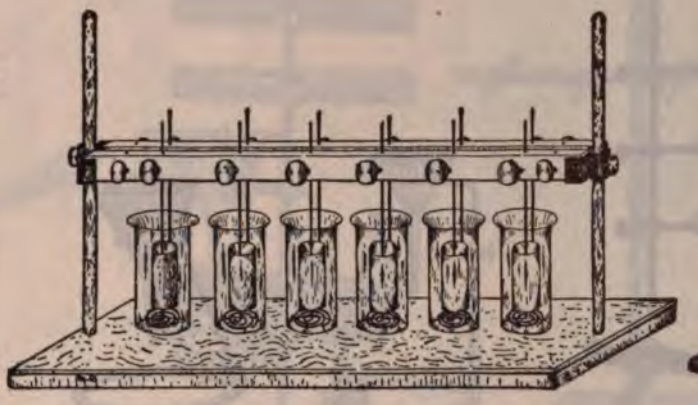
6594

6596

6594. **SUPPORT—Electrolytic,** with ring, clamp, and glass rod **10.00**

6596. **SUPPORT—Electrolytic,** with ring mounted on a separate glass rod **9.00**

6598



6600

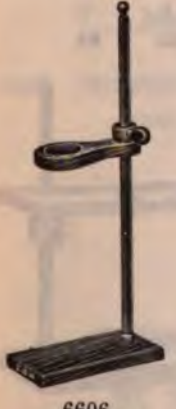
6604

6598. **SUPPORT—Electrolytic,** with two clamps and glass rod **8.00**

6600. **SUPPORT—Electrolytic,** on wooden base arranged for 6 platinum cylinders and spirals **36.00**

6602. **Ditto**—for 12 cylinders and spirals **50.00**

6604. **SUPPORT—Funnel, of wood,** with arm sufficiently large to accommodate beaker containing the liquid to be filtered **1.60**



6606

6608

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6606. **SUPPORT—Funnel, of wood,** for one funnel **1.60**

6608. **Ditto**—with double arm, for two funnels **1.65**

6610. **Ditto**—with single arm, for two funnels **1.25**

6612. **SUPPORT**—with double arm, for four funnels **1.65**

6614. **SUPPORT—Funnel, of hardwood,** for four funnels; with iron clamp for attaching to any retort stand ..... **.80**

6616

6624

6626

6628–30

6616. **SUPPORT—Funnel, of iron,** with three wood lined iron rings **2.00**

6624. **SUPPORT—Funnel,** of heavy wire, adjustable in height from 6 to 10 inches; with ring 2 inches diameter **1.25**

6626. **SUPPORT—Funnel,** of heavy wire, with ring 2¼ inches diameter; not adjustable in height **1.00**

6628. **SUPPORT—Funnel, of wood,** round; to place on beakers.

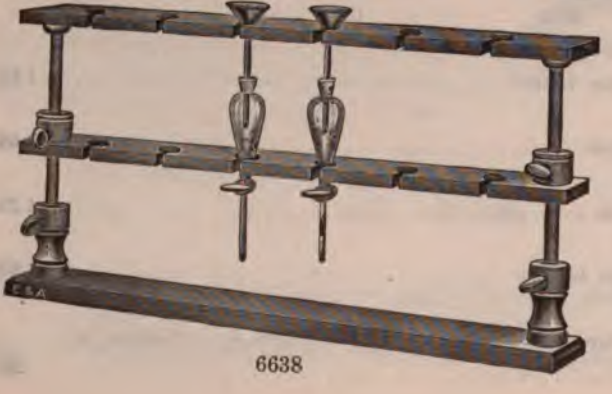
Diameter, inches	4	5	6
Each	.40	.50	.65

6630. **SUPPORT—Funnel, of wood,** triangular.

Length of side, inches	4	5	6
Each	.40	.50	.65

6632

6636



6638

6632. **SUPPORT—Funnel, of wood,** improved pattern, height adjustable; for six funnels in a row **6.75**

6634. **Ditto**—for 12 funnels in a row **10.00**

6636. **SUPPORT**—similar to above, for 12 funnels in two rows **7.25**

6638. **SUPPORT — Separatory Funnel, Leach,** for 6 funnels **9.75**

6640

6642

6644

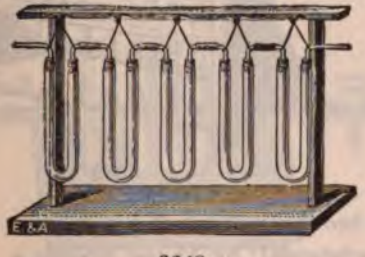
6646

6640. **SUPPORT—Pipette, Revolving,** of polished wood; for 12 pipettes **3.50**

6642. **SUPPORT—Universal, Schellbach,** of wood, with cork lined clamp; heavy base weighted with lead **3.00**

6644. **SUPPORT—Universal, Squibb,** of iron; with small and large sandbaths, adjustable holders for dishes, funnels, pipettes, burettes, etc. **10.00**

6646. **SUPPORT—Universal, Muencke,** of iron; with square base, adjustable horizontal rod, and 4 adjustable holders for U tubes, potash bulbs, etc. **3.60**


6648

6650

6648. **SUPPORT—Universal, of wood,** for suspending U tubes, potash bulbs, etc. **3.00**

6650. **SUPPORT—Universal,** with triangular iron base and rod; adjustable wood arm for U tubes, potash bulbs, etc. **3.00**

6652

6654

6656

6658

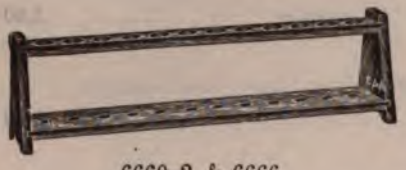
6652. **SUPPORT—Table,** of brass, with levelling screws; diameter 6 inches **8.00**

6654. **SUPPORT—Table,** with triangular iron base, adjustable in height; with lead filled base.

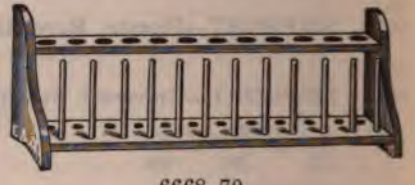
Height when closed, inches	8	9	14
Height when drawn out, inches	9	15	25
Each	**2.75**	**3.80**	**5.00**

6656. **SUPPORT—Table,** with 2 sliding forks and attachments for supporting tubes **6.00**

6658. **SUPPORT—Table,** of cast iron, with fastener for attaching to retort stand; diameter 5 inches ..... **.50**


6660–2 & 6666

6664


6668–70

6660. **SUPPORT—Test tube, of wood,** for 6 test tubes ..... **.50**

6662. **Ditto**—for 12 test tubes in a row ..... **.90**

6664. **SUPPORT**—as above, but for 12 test tubes in 2 rows **1.00**

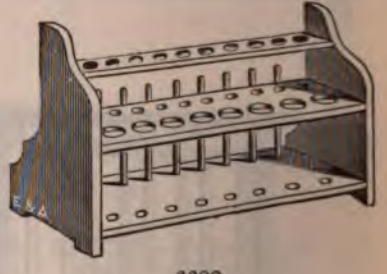
6666. **SUPPORT**—extra large, like No. 6664, but for 12 test tubes up to 1 inch diameter.... **1.35**

6668. **SUPPORT—Test tube, of wood,** for 6 test tubes; with draining pins ..... **.90**

6670. **Ditto**—for 12 test tubes in a row; with draining pins **1.10**

6676

6678


6682

6672. **SUPPORT—Test Tube, of wood,** for 12 test tubes in two rows; with 6 draining pins... **.85**

6674. **SUPPORT—Test tube, extra heavy,** of wood, very substantial; for 12 test tubes in a row **1.00**

6676. **Ditto**—with draining pins **1.40**

6678. **SUPPORT—Test tube of wood, with 2 shelves;** for 13 tubes ..... **.75**

6680. **Ditto**—for 25 tubes **1.10**

6682. **SUPPORT**—as above, for 13 tubes; with draining pins ..... **.85**

6684. **Ditto**—for 25 tubes; with draining pins **1.50**

6686

6688

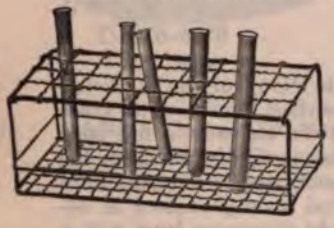
6692

6686. **SUPPORT—Test tube, of wood,** without glued joints, shipped knocked down with directions for putting together; for 16 test tubes; with 8 draining pins **1.00**

6688. **SUPPORT—Test tube, of stamped steel,** black enamel covered, therefore not readily corrodible; for 14 tubes up to 1 inch diameter; with drying pins ..... **.65**

6692. **SUPPORT—Test tube, of copper,** useful for heating tubes in a water bath.

Diameter, cm.	12	18
Each	**2.20**	**2.75**



6694

6696

6698

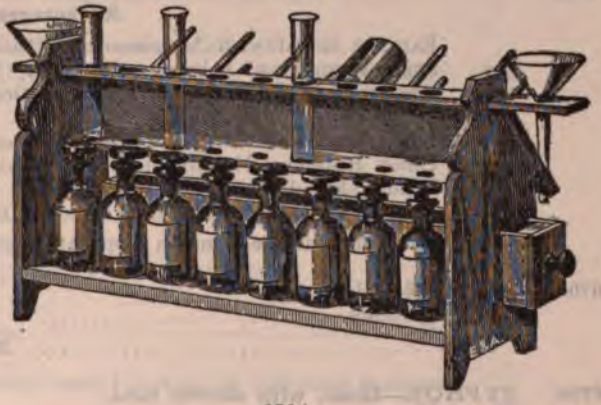
6694. **SUPPORT—Test tube, of galvanized heavy iron wire;** for 36 test tubes ..... **.80**

6696. **SUPPORT—Fermentation tube,** of copper, for incubating; accommodates 10 Smith fermentation tubes; substantial, and well finished **4.00**

6698. **SUPPORT—Test tube,** for drying test tubes; with 25 pins **2.40**

6700. **Ditto**—with 50 pins **3.00**

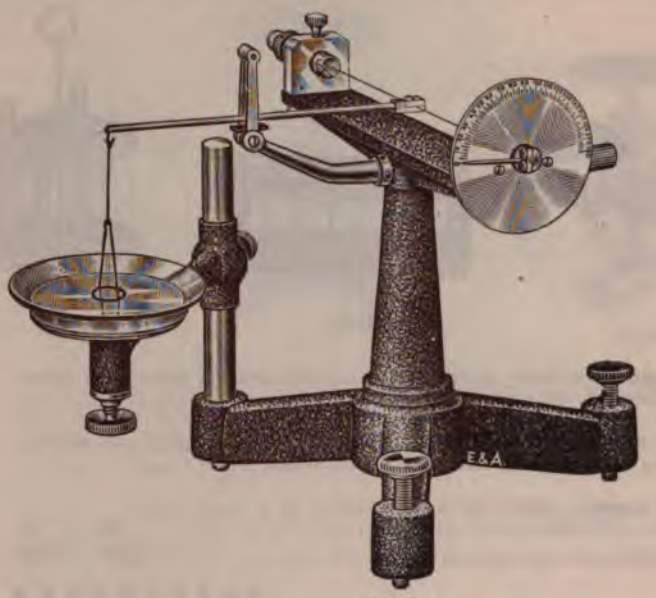
6702



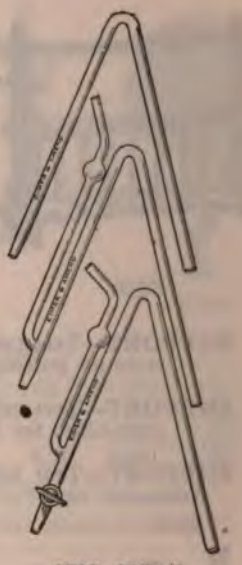
6704

6702. **SUPPORT—Test tube, of wood,** for 18 test tubes; with drying pins, shelf to hold 4 funnels, and drawer for pipettes, etc. **3.50**

6704. **Ditto—Heavier,** filter with 18 test tubes, 2 pipettes, 2 stirrers, 8 reagent bottles, and two 2½ inch funnels **10.00**



6705



6708–6708/1

6705. **SURFACE TENSION APPARATUS**—Designed by Dr. du Nouy of the Rockefeller Institute. For rapidly and accurately measuring the surface tension of all kinds of liquids. It consists essentially of a stand provided at the top with a fine steel wire stretched between end supports. One end of the wire is tightly clamped, the other being attached to a worm wheel controlled by thumb-screw. To the worm wheel is also attached a pointer which moves over a metal scale graduated in degrees. To the middle of the wire is clamped a hollow, light aluminum lever with a small hook in the outer end. A stirrup is attached to this hook carrying a carefully made loop of platinum-iridium wire with a periphery exactly 4 cm. in length. The watch glass, or other vessel containing the liquid, is placed on the platform carefully raised by means of the adjusting screw until the platinum loop has made contact with the liquid. The pointer having been previously set at zero, the torsion of the wire is gradually increased by means of the thumb-screw controlling the worm gear, until the loop of wire tears loose from the liquid. The number of degrees is then read from the scale and by a simple calculation is converted directly into dynes per cm. **60.00**

Advantages

Extreme Rapidity of Measurements (15–20 seconds).
Small Quantity of Substance Required (1 cc.).
Accuracy and Reliability of Determination.
Simplicity of Technique.
Reliability for Use with Colloidal Substances.
Direct Reading. No Complicated Formulas or Calculations.
Readily Standardized and Calibrated.
Ruggedness and Freedom from Defects Occasioned by Continuous Use.

For other **Surface Tension Apparatus,** see Numbers 4567 and 4568.

6706. **SYPHON—Glass, plain.**

Length, inches	8	12	15	18	24	30
Each	**.30**	**.36**	**.42**	**.60**	**.90**	**1.00**

6708. **SYPHON—Glass, with suction tube.**

Length, inches	8	12	18	24	30
Each	**.55**	**.65**	**.95**	**1.30**	**1.60**

6708/1. **SYPHON—Glass, with stopcock and suction tube.**

Length, inches	8	12	18	24	30
Each	**2.25**	**2.75**	**3.50**	**4.75**	**5.75**

6709 6712 6714 6716 6718 6720

6709. **TANK—Electrically Heated.** Made of copper. For furnishing a constant supply of hot water. Capacity 5 gallons; three heats; maximum current consumption 1000 watts. For 110 volts **40.00**

6709/1. **Ditto**—for 220 volts **44.00**

6711. **TAPERS—Wax,** to burn in oxygen ..... **per box** **.20**

6712. **TEST GLASS—So-called "Thief Glass,"** to take samples from barrels, etc.

Capacity, pints	1	2
Each	**3.00**	**3.50**

6712/1. **TEST GLASS**—Similar to No. 6712, but straight glass tube, no bulb **2.00**

6714. **TEST GLASS—Conical, tall form,** with lip, for sedimentation.

Capacity, cc.	30	60	125	175	250
Each	**.45**	**.55**	**.65**	**.80**	**1.10**

6716. **Ditto—Low form,** with lip.

Capacity, cc.	30	60	125	175	250
Each	**.45**	**.55**	**.65**	**.80**	**1.10**

6718. **TEST GLASS—Cylindrical,** with lip; useful for the lecture table.

Capacity, cc.	125	250
Each	**.75**	**1.35**

6720. **TEST GLASS—Urinometer,** with heavy conical bottom for collecting sediment.

Height, cm.	15	20
Each	**.85**	**1.10**

Test Papers—see Paper.

Test Tubes—see Tubes.

Thermometers

The thermometers listed below are made of resistance glass and are of the highest accuracy. For the most part they are of our own manufacture. Thermometers of special range or size made to order at short notice.

If the thread of mercury in the thermometer should happen to break in transit, the thermometer should be warmed in a bath of water or oil till the reservoir at the top of the tube, which is intended to prevent the bursting of the tube in case of inadvertent overheating, becomes about half filled with mercury. The bath containing the thermometer is then allowed to cool down gradually, when, as a rule, at the first trial the broken thread will unite; if unsuccessful the process must be repeated.

To reduce Centigrade degrees to those of Fahrenheit

Rule.—Multiply by 9, divide by 5, and add 32. Thus:—

Cent. Fahr.

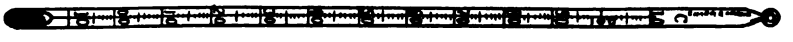
$$40 \times 9 \div 5 + 32 = 104$$

To reduce Fahrenheit degrees to those of Centigrade

Rule.—Subtract 32, multiply by 5, and divide by 9. Thus:—

Fahr. Cent.

$$104 - 32 \times 5 \div 9 = 40$$



6724

6724. **THERMOMETER—Chemical, scale engraved on the stem,** white enameled back, diameter 6 to 7 mm.

Graduated to	100°C.	150°C.	200°C.	250°C.	212°F.	300°F.	400°F.
Subdivisions	1/1	1/1	1/1	1/1	2/1	2/1	2/1
Length about, cm.	30	30	35	35	30	30	35
Each	**1.40**	**1.50**	**1.85**	**2.20**	**1.40**	**1.50**	**1.85**
Dozen	**15.30**	**16.20**	**20.70**	**23.40**	**15.30**	**16.20**	**20.70**

6726. **Ditto—with magnifying front.**

Graduated to	110°C.	150°C.	200°C.	250°C.	212°F.	300°F.	400°F.
Subdivisions	1/1	1/1	1/1	1/1	2/1	2/1	2/1
Each	**1.60**	**1.75**	**2.00**	**2.25**	**1.60**	**1.75**	**2.00**

6728. **THERMOMETER**—like No. 6724, but **nitrogen filled,** to prevent separation of mercury when used at high temperatures.

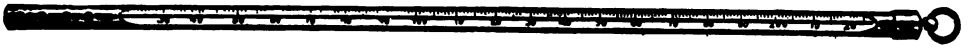
Range	300°C.	360°C.	400°C.	600°F.	750°F.	950°F.
Graduation	1/1	1/1	1/1	2/1	1/1	5/1
Length about, cm.	40	40	40	40	50	40
Each	**2.30**	**2.50**	**3.00**	**2.30**	**4.50**	**10.00**

6730. **THERMOMETER**—like No. 6724, **but with two scales, engraved on the stem,** diameter 8–10 mm.; the 360°C.–680°F. N. filled.

Graduated to	100°C.–212°F.	200°C.–400°F.	360°C–680°F.
Length about, cm.	30	35	38
Each	**2.50**	**3.00**	**3.50**

6732. **THERMOMETER—Chemical, scale engraved on the stem,** white enameled back, diameter 6–8 mm.

Graduated to °C.	0–50	0–50	0–100	0–100	100–200	100–200	0–200	200–300	200–300
Subdivisions	1/5	1/10	1/5	1/10	1/5	1/10	1/5	1/5	1/10
Length, cm.	33	38	40	60	50	60	60	50	60
Each	**3.00**	**4.25**	**4.50**	**8.00**	**6.00**	**9.00**	**8.00**	**7.25**	**10.00**



6734–36

6734. **THERMOMETER—Armored, scale graduated on the stem,** with white background. The armor is made of one piece of seamless drawn steel tube, nickel plated.

Graduated to °F.	220	400	600	750	950
Subdivisions	2/1	2/1	2/1	2/1	5/1
Length, cm.	30	35	40	40	40
Each	**6.00**	**7.00**	**8.00**	**10.00**	**13.00**

6736. **Ditto**—graduated in Centigrade degrees.

Graduated to °C.	100	200	400	510
Subdivisions	1/1	1/1	1/1	2/1
Length, cm.	30	35	40	40
Each	**6.00**	**7.00**	**10.00**	**13.00**

6738. **THERMOMETER—Alcohol filled, red liquid; graduated on stem.**

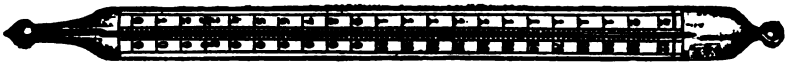
Graduated to	100°C.	212°F.
Length about, cm.	30	30
Each	**2.60**	**2.60**

6740. **THERMOMETER—Chemical, enclosed milk glass scale;** diameter about 8–10 mm.

Graduated to	100°C.	150°C.	200°C.	250°C.	212°F.	400°F.
Length about, cm.	30	30	35	35	30	35
Each	**2.70**	**2.80**	**3.00**	**3.15**	**2.70**	**3.00**
Dozen	**30.00**	**31.00**	**33.00**	**35.00**	**30.00**	**33.00**

6742. **Ditto—Nitrogen filled,** to prevent separation of mercury when used at high temperatures.

Graduated to	300°C.	360°C.	600°F.
Length about, cm.	35	40	40
Each	**3.25**	**3.50**	**3.50**



6746

6744. **THERMOMETER—Chemical, paper scale,** enclosed in glass tube of resistance glass; diameter about 8–10 mm.

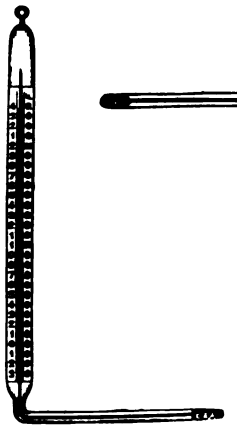
Graduated to	100°C.	200°C.	130°F.	212°F.	400°F.
Length about, cm.	30	35	19	30	35
Each	**1.80**	**2.15**	**1.70**	**1.80**	**2.15**
Dozen	**20.00**	**24.00**	**18.50**	**20.00**	**24.00**

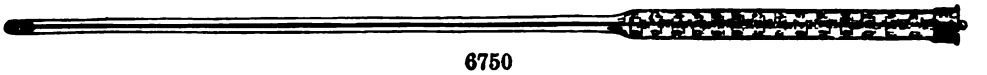
6746. **Ditto**—Large diameter, 20–22 mm., large figures, easily read at a distance.

Graduated to	100°C.	150°C.	200°C.	130°F.	212°F.	300°F.	400°F.
Length about cm.	30	35	35	30	30	35	35
Each	**1.90**	**2.00**	**2.25**	**1.85**	**1.90**	**2.00**	**2.25**
Dozen	**21.00**	**22.00**	**25.00**	**20.50**	**21.00**	**22.00**	**25.00**

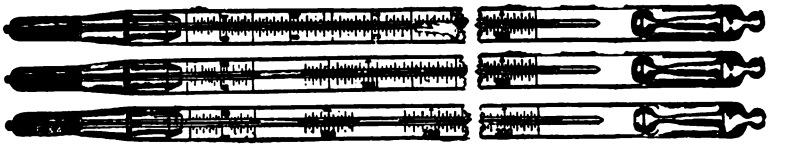
6748. **THERMOMETER—Chemical, paper scale, with two scales, C. & F.,** diameter about 10 mm.

Graduated to	100°C.–212°F.	200°C.–400°F.
Length about, cm.	30	35
Each	**2.50**	**3.00**





6750



6752 6768

6750. **THERMOMETER—for manufacturing purposes; enclosed milk glass scale; any** range to 600°F., or 360° C., stem of any desired length; made to order only.

6750/1. **Ditto—with brass cap on end.** Give details.

6750/2. **THERMOMETER**—like No. 6750, but **paper scale.** Give details.

6752. **THERMOMETER—Right Angle, paper scale,** for acid chambers; body 30 cm. long, 2 cm. diameter; stem 15 cm. long, 1 cm. diameter.

Graduated to	100°C.	200°C.	260°F.	400°F.
Each	**3.25**	**3.50**	**3.25**	**3.50**

6754. **Ditto—milk glass scale.**

Graduated to	100°C.	200°C.	260°F.	400°F.
Each	**3.85**	**4.25**	**3.85**	**4.25**

Thermometers—For Low Temperatures

6756. **THERMOMETER—Low temperature, alcohol filled; graduated on stem; red liquid;** reading − 50° to + 50° C.; length about 30 cm., diameter 8 mm. **2.60**

6758. **THERMOMETER—Toluene filled, graduated on stem,** reading − 100° to + 50° C.; length about 30 cm. **15.00**

6760. **THERMOMETER—Pentane filled; graduated on stem,** reading − 200° to + 50° C.; length about 30 cm. **20.00**

Standard Thermometers

6762/1. **THERMOMETER—Standard, with Bureau of Standards certificate, graduated on the stem;** average length 50 cm., diameter 10 mm.

Graduated to °C.	0–50	0–100	0–100	0–200	100–200	200–300
Subdivisions	1/10	1/5	1/10	1/5	1/5	1/5
Each	**12.00**	**14.00**	**20.00**	**20.00**	**17.00**	**20.00**

6766. **THERMOMETER**—like No. 6762/1, but **without certificate.**

Graduated to °C.	0–50	0–100	0–100	0–200	100–200	100–200	200–300	200–300
Subdivisions	1/10	1/5	1/10	1/5	1/5	1/10	1/5	1/10
Each	**6.50**	**7.00**	**12.00**	**12.00**	**10.00**	**13.50**	**12.00**	**15.00**

6768. **THERMOMETER—Standard, enclosed milk glass scale, without certificate.**

Graduated to °C.	0–50	0–100	0–100	0–200	100–200	100–200	200–300	200–300
Subdivisions	1/10	1/5	1/10	1/5	1/5	1/10	1/5	1/10
Each	**10.00**	**11.00**	**16.00**	**16.00**	**15.00**	**19.00**	**16.00**	**20.00**

6781

6770. **THERMOMETER—Standard, Boro-Silicate Glass, filled with Carbon Dioxide** at a pressure of 20 atmospheres; with enlargement at the upper end of the capillary to prevent boiling of the mercury; fixed zero point. Scale graduated on the stem; average length 45 cm., diameter 8 mm. Reading 180° to 500° C. in 1/1° **without certificate** **12.00**

6771. **THERMOMETER**—similar to above, but graduated in 2/1° to 1000° F.; **without certificate** **12.00**

6781. **THERMOMETERS—Standard, Allihn.** Set of three, 15 to + 100° C., 100° to 200° C., and 200° to 300° C., each in ½°, 30 cm. long, 8 mm. diameter; with zero and boiling point corrections; enclosed milk glass scale; in fine velvet lined case **30.00**

6784. **THERMOMETERS—Standard, Anchutz,** for fractional distillations, etc. The range − 10° to + 360° C. is divided over seven thermometers; length about 15 cm., diameter 6 mm.; **enclosed milk glass scale.**

Subdivisions	1/1°	1/2°	1/5°
No. 1 from − 10 to + 60°	**5.50**	**6.00**	**6.50**
No. 2 from + 40 to + 100°	**5.50**	**6.00**	**6.50**
No. 3 from 90 to 160°	**5.50**	**6.00**	**6.50**
No. 4 from 150 to 220°	**5.50**	**6.00**	**6.50**
No. 5 from 200 to 270°	**5.50**	**6.00**	**6.50**
No. 6 from 250 to 310°	**5.50**	**6.00**	**6.50**
No. 7 from 300 to 360°	**5.50**	**6.00**	**6.50**

6786. **Ditto—the set of seven,** graduated in 1/1°; in velvet lined case **38.50**

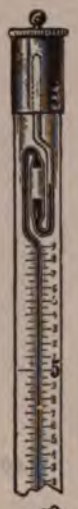
6788. **Ditto—the set of seven,** graduated in 1/2°; in velvet lined case **42.00**

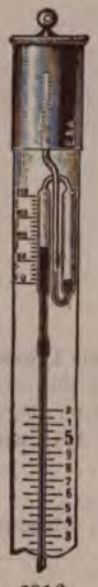
6790. **Ditto—the set of seven,** graduated in 1/5°; in velvet lined case **45.00**

6791. **THERMOMETERS**—According to Dr. Harry Fisher, formerly of Columbia University. Set of three. Especially intended for the use of advanced students in Organic Chemistry. These thermometers are so constructed that the entire scales are exposed to the vapors of the liquids which are being boiled or distilled. The error due to cooling of the Mercury column in the case of the ordinary thermometers is thus overcome, and very accurate readings are made possible. Length of each thermometer 18 cm.

No. 1 15 — 135° C. in 1/1 ..... **3.00**
No. 2 95 — 215° C. in 1/1 ..... **3.00**
No. 3 175 — 295° C. in 1/1 ..... **3.00**

6791/1. **Ditto—the set of three,** complete in Bakelite case **10.00**
a. Case only **1.50**





6816

Beckmann Thermometers

The scale of these thermometers, which comprises only a few degrees graduated upwards, is divided in 1/100° or 1/500° C., and can be read by the aid of a lens to 1/500° or 1/1000° C. A special contrivance at the upper end of these thermometers permits the separation of any desired quantity of mercury from the main column, thus adjusting the thermometer for any temperature required. Thermometers are made for freezing point and boiling point determinations.

6804. **THERMOMETER—Beckmann,** range about 5 degrees C. in 1/100° subdivisions, with scale sealed into body with glass; suitable for standardizing **20.00**

6806. **Ditto—with U. S. Bureau of Standards certificate** **40.00**

6810/1. **THERMOMETER—Beckmann,** similar to No. 6804, but with range about 2 degrees C in 1/500 subdivisions **price on application**

6814. **THERMOMETER—Beckmann, with scale graduated on stem, with auxiliary scale,** similar to No. 6816 **price on application**

6816. **THERMOMETER—Beckmann, with auxiliary scale,** range about 5 degrees C. in 1/100° subdivisions, **with scale sealed into body with glass.** The auxiliary scale ranges from −20° to + 120° C. in 2°..... **22.50**

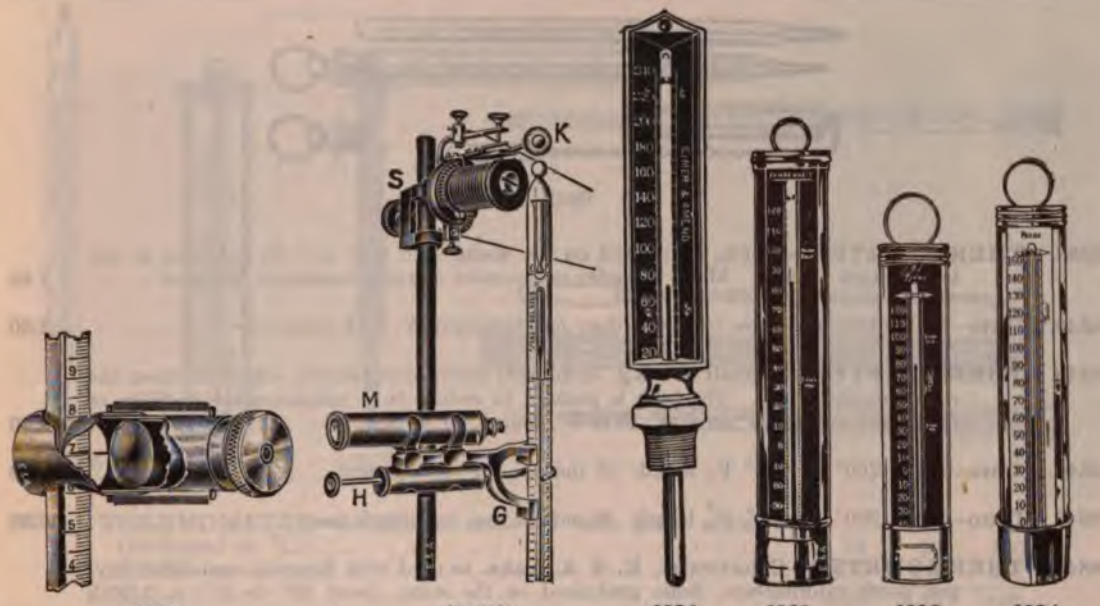
6816/1. **Ditto—with U. S. Bureau of Standards certificate** **42.50**

The auxiliary scale makes it possible to set the mercury quickly and accurately to any desired temperature range on the scale divided into 1/100°. At the same time it conveniently records this temperature for any later date when the thermometer is wanted again, and thus indicates whether mercury has to be added, or taken away, from the top reservoir if another temperature is required.

The auxiliary scale differs so far from the true Centigrade scale that, for example, the mercury which is separated from the upper capillary end at 50° of the auxiliary scale only shows the true 50° C. in the middle of the scale divided into 1/100°. This enables one to set the mercury column in the reservoir by one separation, to the desired degree, without having to bring down by tapping a further supply of small mercury beads. Should it be necessary to bring mercury into the reservoir, the thermometer should be inclined forward in order to get the mercury in the top of the reservoir in contact with the mercury column of the thermometer; the reservoir is now warmed over a Bunsen burner until the required degree is reached on the auxiliary scale. By a sudden jerk downwards or a slight knock on the table, or by tapping the mercury vessel with a piece of wood, the remaining mercury is at once separated from the mercury column, and the degree shown on the auxiliary scale division at the moment of separation will show at the end of the column in the middle of the scale divided into 1/100 of a degree.

6804

6817. **THERMOMETER—Beckmann,** similar to No. 6816, but with improved patent adjustment of auxiliary scale by means of mercury drops instead of by tapping. This is accomplished by the introduction of a short capillary in the lower part of the reservoir, the point of which is adjusted for delivering drops of mercury, each equivalent to a definite range of the thermometer scale, which information is engraved on the scale of each thermometer as, for instance, 1 drop = 1.5° C. This arrangement prevents the dropping down of the mercury when an upward movement is necessary, and superfluous mercury may be transferred to the two arms at the side of the reservoir by simply inclining the thermometer. When a reservoir has become filled during transportation it will empty itself automatically if the thermometer is held perpendicularly. In other reservoir arrangements this is frequently prevented by the small particles of air which are often present in thermometers of best make. In this new arrangement such air particles are caught and held below the inlet in the reservoir. This arrangement makes possible very exact setting, greater durability and less risk of breakage in transportation and obviates the continuous tapping down of the mercury column as heretofore practiced **30.00**



6818 6819/1 6826 6828 6832 6834

6818. **THERMOMETER**—Reader, with strong spring clamp arrangement, accommodating thermometer of any diameter from 6 mm. up to a Beckmann **6.00**

6819/1. **THERMOMETER—Tapper,** to prevent sticking of mercury thread when reading changing temperatures **20.00**

6826. **THERMOMETER—Straight, iron frame,** for hot water and steam; scale range 0 to 220° F. Length of stem 3½ inches, ¾ inch S. P. thread.

Length of scale, inches	7	9
Each	**8.75**	**10.50**

6827. **Ditto—Angle.**

Length of scale, inches	7	9
Each	**11.50**	**13.50**

6828. **THERMOMETER—In black japanned tin case,** mercury filled tube, black oxidized metal scale, graduated from − 10° to + 120° F.

Length, inches	8	10
Each	**1.10**	**1.30**
Dozen	**12.00**	**14.00**

6832. **THERMOMETER—In heavy copper case, Standard grade,** silvered brass scales; graduated from 0° to 220° F., length 10 inches ..... each **2.25**
dozen **24.30**

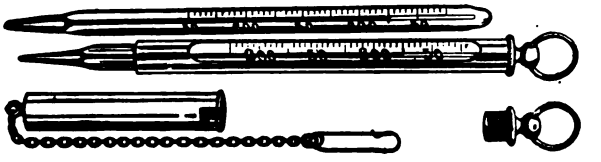
Thermometers for Special Purposes

6832/1. **THERMOMETER—Cold Storage,** similar to No. 6832; black japanned heavy tin case; Perma (red) color tube; 12″ long, range − 20° to + 70° F. in single degrees **2.25**

6833. **THERMOMETER—Meat Testing,** 11″ nickel plated brass case, skewer shape, sharp pointed steel stem, range 20° to 120° F. in single degrees **7.00**

6833/1. **Ditto**—range 100° − 220° F. **7.00**

6834. **THERMOMETER—Standard grade, for sugar factory use;** range 0° to 150° C., silvered brass scale, in 12 inch copper cup case ..... each **3.50**
dozen **37.80**



6842–6

6838. **THERMOMETER—Alarm, graduated on the stem,** with wire in bulb and wire at any temperature desired. Made to order only—state alarm temperature required **7.50**

6840. **Ditto**—with additional wires for more than one temperature, each extra wire **2.00**

6842. **THERMOMETER—Asphalt testing, armored;** made exceptionally robust to meet the requirements of use. The bulb is pointed to reduce to a minimum the liability of breakage; range 100° to 600° F. in 5°, length 16 inches **8.00**

6844. **Ditto**—range 200° to 750° F., length 16 inches; for testing sand **10.00**

6846. **Ditto**—range 200° to 400° F., length 6 inches; for inspector's use **6.00**

6848. **THERMOMETER—Calorimeter, E. & A. make,** as used with Emerson and other oxygen bomb calorimeters. Scale graduated on the stem, about 16° to 31° in 1/50th divisions **20.00**

6850. **Ditto—with Bureau of Standards certificate** **40.00**

6852. **THERMOMETER**—Similar to No. 6848, graduated in 1/100° C., **without certificate** **25.00**

6854. **Ditto—With Bureau of Standards certificate** **45.00**

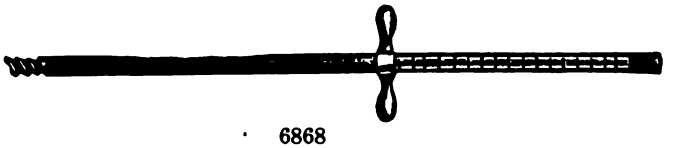
6860. **THERMOMETER—Calorimeter, for Parr calorimeter,** etc. Scale graduated on stem, reading 65° to 90° F. in 1/20°. Length about 60 cm.; **with Bureau of Standards certificate** **12.00**

6862. **Ditto**—reading 65° to 105° F., length about 65 cm., **with Bureau of Standards certificate** **15.00**

6864. **THERMOMETER—for gas calorimeter,** etc., enclosed milk glass scale, reading 0° to 50° C. in 1/10th **6.00**

6866. **Ditto**—reading 0–120° F. in 1/5th **6.00**

6867. **THERMOMETER—for gas calorimeter,** etc., 18″ long, 30° to 130° F. in 1/5th **6.00**



6868

6868. **THERMOMETER—Soil, mounted in metal case,** with borer for taking temperature of soils at different depths; scale reading 0° to 60° C. in 1/10th.

Length below handle, meters	½	1	2	3
Each	prices on application			

6869. **THERMOMETER—Dough Testing,** 7″ nickel plated iron case, 11″ steel stem, silvered metal scale with black figures, range 30° to 120° F. **9.00**

6870. **THERMOMETER—Titer test, graduated on stem,** reading 10° to 60° C. in 1/10th, with zero mark and auxiliary reservoir at upper end. Length about 37 cm.; diameter 6 mm.; in case (see Bulletin No. 107, U. S. Dept. Agr., page 136) **6.00**

6872. **Ditto—with Bureau of Standards certificate** **11.00**

6876–8 6880 6882 6874 6886

6874. **THERMOMETER—Incubator, enclosed milk glass scale.**

Graduated to °C.	50	50	100
Subdivisions	1/10	1/5	1/1
Each	**5.50**	**5.25**	**5.00**

6875. **THERMOMETER—Distillation, for turpentine,** 145° to 200° C. in 1/5°. Length top of bulb to 145° mark not less than 1.5 cm., length 145° to 175° mark not more than 6 cm. Length 175° mark to top not more than 8 nor less than 6.5 cm. **6.00**

6875/1. **THERMOMETER—Distillation,** 0° to 400° C. in 1/1°, **for Paint Thinners other than turpentine,** as per specifications of the A. S. T. M., see Proceedings of A. S. T. M., 1918, page 606 ..... **6.00**

6875/2. **THERMOMETER—Distillation, for Motor Gasoline,** 0° to 300° C. in 1/1°, as per specifications of Technical Paper 166 ..... **6.00**

6875/3. **THERMOMETER—for Cold Test. Paper scale** graduated from −20° to 120° F., in 2°. For determining the congealing point of lubricating oils. Length approximately 8 inches **2.50**

6875/4. **Ditto—graduated on stem** **2.00**

6876. **THERMOMETER—Dairy, enclosed paper scale** reading −20° to 150° F. in 2°, length about 18 cm., diameter 15 mm. ..... **each 1.65**
dozen 18.50

6878. **THERMOMETER—Sugar, enclosed paper scale** reading 0° to 50° C.; length about 18 cm., diameter 15 mm. ..... **each 1.65**
dozen 18.50

6880. **THERMOMETER—Candy makers, silvered brass scale,** 8 inches; range about 100° to 360° F., in copper case ..... **each 2.00**
dozen 21.60

6882. **THERMOMETER—Hot Bed, wood frame,** 16 inches with handle; brass pointed ferrule, brass oxidized scale. Approximate range 30° to 180° F. ..... **each 2.25**

6886. **THERMOMETER—Pocket, with aluminum case** 5 inches long; range 30° to 220° F. in 2/1° **3.00**

6886/1. **Ditto—without case** **2.75**

6888. **THERMOMETER**—similar to 6886, but range 0° to 100° C. in 1/1°, **with case** **3.00**

6888/1. **Ditto—without case** **2.75**

6890

6892

6896

6902/1

6890. **THERMOMETER—Household,** ordinary quality, on walnut finish wooden frame; scale range 10° to 40° below to 120° F. above.

Length, inches	8	10
Each	.65	.95
Dozen	7.00	10.00

6892. **THERMOMETER—Household, Standard quality,** on oak frame, ebonized scale; very reliable; scale approximately 10° to 40° below to 120° F. above.

Length, inches	8	10
Each	1.65	1.80

6894/1. **THERMOMETER—Window,** solid cast bronze polished case, 11" long, 2⅝" wide. Non-corrosive zinc scale. Range about 50° below to 120° F. above. Perma (red) color filled tube **4.00**

6896. **THERMOMETER—Wood frame,** scale reading to 120° F., length 12 inches ..... **.60**

6898. **Ditto**—scale reading to 220° F., length 17 inches **1.75**

6899. **THERMOMETER—Bath,** 12" long, white enamel frame with handle, nickel plated scale, range 30° to 150° F. **1.35**

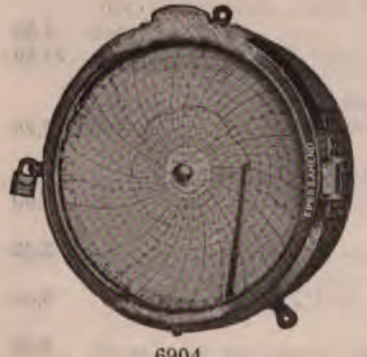
THERMOMETERS—Clinical, see Bacteriological Catalog, Section II.

6902/1. **THERMOMETER—Recording Thermograph,** fitted in gray metal case 7 day cylinder clock, 3 charts, namely + 20° to + 120° F., − 10° to + 90° F. and 0° to 100° F., complete with year's supply of charts **54.00**

a. **Chart**—for above range − 20° to + 120° F.....**set** **3.50**

b. **Ditto**—range − 10° to + 90° F. .....**set** **3.50**

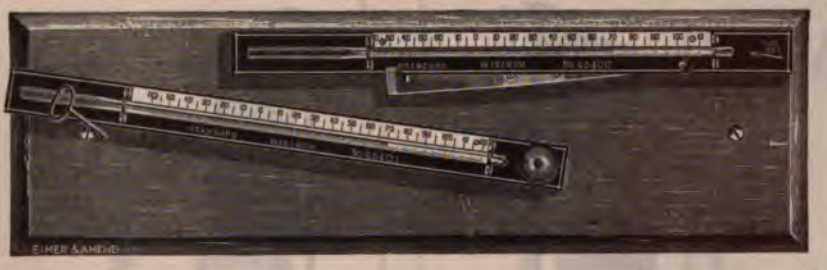
c. **Ditto**—range 0° to 100° F. .....**set** **3.50**



6904

6904. **THERMOMETER—Recording,** self-contained, quick acting, range + 10° to + 120° F. in 2/1°. Period of revolution 24 hours. The case is one piece of brass, finished in handsome weather resisting black, with bronze front **63.00**

6905. **Ditto**—with chart calibrated from − 20° to + 50° C. in 1/1°. Period of revolution 7 days **63.00**



6914

6914. **THERMOMETER—Maximum and Minimum, Weather Bureau type,** with certificates; engraved plain-bore tubes, round bulbs, mounted on 12-inch aluminum scales, on which are marked the figures every 10 degrees and every five-degree line of the scale. Minimum tube filled with uncolored spirit. Brass insulating supports with binding screws, mahogany-finish board 17 inches by 5 inches. Each in a wooden box. Per set **13.50**

6916. **Ditto—The Maximum thermometer only,** with insulating support; without board... **6.30**

6918. **Ditto—The Minimum thermometer only,** with insulating support; without board **6.30**

6922. **THERMOMETER—Maximum and Minimum, Six's,** self-registering, best make; black japanned tin case, black oxidized brass scale, white filled figures; with magnet. Scale range 10° to 40° below zero to 120° F. above; length 8 inches **5.50**

6923. **Ditto**—in copper case **6.00**

6924. **THERMOMETER**—like No. 6922, but 10 in. long **6.00**

6925. **Ditto**—in copper case **6.50**

THERMOMETER—for Coal Tar, etc., see Bituminous Materials Section.

THERMOMETER—Cathetometer for reading, see Nos. 1775 and 1775/1.

THERMOMETER—for Daniels' Adiabatic Jacket, see No. 1657/9.

THERMOMETERS—for Flash Point Testers, see Oil Testing Apparatus.

THERMOMETER—Freas Incubator 0° to 70° C. in ½°, stem 13½″ long below graduation, see Bacteriological Catalog, Section II.

THERMOMETER—Freas Regular Oven, Engraved scale 0° to 200° C. in 1/1°, stem 12″ below graduation, see No. 4816a.

THERMOMETER—Freas High Temp. Oven, similar to Regular except 0° to 300° C. in 1/1°, see No. 4818a.

THERMOMETERS—for Hortvet Cryoscope, see Nos. 4437/2 and 4437/3.

THERMOMETERS—with hydrometers, see Hydrometers.

THERMOMETER—for Juerst Ebullioscope, see No. 119a.

THERMOMETER—Plummets, see page 44.

THERMOMETERS—Refractometer, see pages 477–478.

THERMOMETER—Thelco Incubator, 0° to 50° C. in ½°. Milk glass scale, red line at 37½°, see Bacteriological Catalog, Section II.

THERMOMETERS—for Viscosimeters, see Oil Testing Apparatus and Viscosimeters.

THERMO REGULATORS—see Regulators.

THISTLE TUBES—see page 248.

TIN BOXES—see No. 1180.

TINTOMETERS—see pages 168–171.

Front View Rear View

6927

6927. **TITRATION APPARATUS—(Potentitration) Eppley.** See Jour. Am. Chem. Soc., 35-869-1913; 38-341-1916, etc.

For determining the end-points of titrations either by the plotting of readings proportional to Electromotive Force, or by observing the "flip" of a galvanometer needle; the first method being the more accurate, the second the more rapid. The potentiometer slide-wire is so connected that E. M. F. of changing sign can be followed readily. The portable calomel electrode has flushing device; the right- and left-handed burettes are easily filled; the stirrer is directly driven, the speed of the motor being controlled by a conveniently accessible rheostat.

Outfit complete with electrode filled ready to connect, one liter of standard KCl solution and three sealed-in platinum electrodes **225.00**

State whether stirring-motor is to be used on A.C. or D.C. current and advise voltage.

Separate Parts

a. **Calomel Electrode**—portable, filled ready to use **10.00**

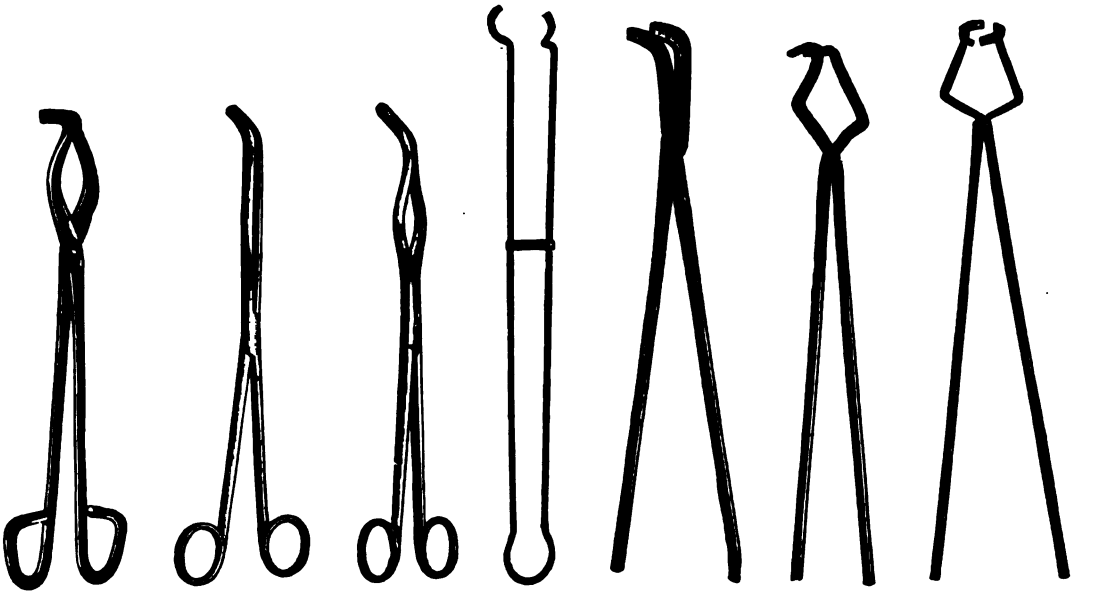
b. **Platinum Electrodes**—sealed in, with metal collar, three in set .....**set** **3.50**

c. **Set of Burettes**—one each right- and left-handed, funnel tops **15.00**

d. **Standard KCl Solution**—(saturated both with KCl and Calomel) 1 liter in glass stoppered bottle **2.00**

e. **Specially prepared Calomel** .....**lb.** **4.00**

f. **Redistilled Mercury** .....**at market price**



6928 6930 6936–40 6932 6934 6954 6956 6958

6928. **TONGS—Crucible, steel wire, nickel finish, double bent; 9 inches long** ..... each .35
dozen 4.00

6930. **TONGS—Crucible, steel, nickel plated, superior quality; single bent.**

Length, inches	9	12
Each	2.25	3.00

6932. **TONGS—Similar to No. 6930, but double bent.**

Length, inches	9	12
Each	2.50	3.50

6934. **TONGS—Cupel, steel,** nickel plated, 20 inches long; for handling crucibles, etc., in muffle ..... each 2.65

6936. **TONGS—Crucible, polished brass, single bent;** 8 inches long ..... each 1.10

6938. **TONGS—Similar to No. 6936, but double bent** ..... each 1.20

6940. **TONGS—Crucible, heavy iron, japanned, single bent;** 10 inches long ..... each 1.50

6942. **TONGS—Similar to No. 6940, but double bent** ..... each 1.75

6844. **TONGS—Crucible, pure nickel rod, double bent,** 8 inches long ..... each 4.00

6945. **Ditto—12 inches long** ..... each 5.50

6946. **TONGS—Nickel, 8 inches long, with heavy platinum shoes** ..... price on application

6948. **TONGS—Crucible, nickel silver, double bent,** 8 inches long 2.00

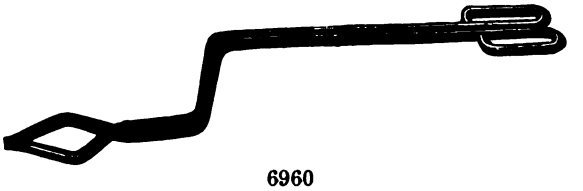
6950. **TONGS—Crucible, steel,** nickel plated, **single or double bent;** 9 inches long, **with heavy platinum shoes** ..... price on application

6954. **TONGS—Crucible, wrought iron, single bent;** for heavy crucibles, etc.

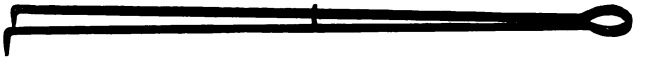
Length, inches	15	20	25	30
Each	1.20	1.35	1.50	1.80

6956. **TONGS—double bent, 30 inches long** 3.00

6958. **TONGS—double bent, 33 inches long;** for lifting vertically crucibles up to 4 inch diameter 2.60



6960



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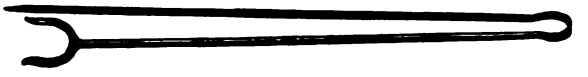
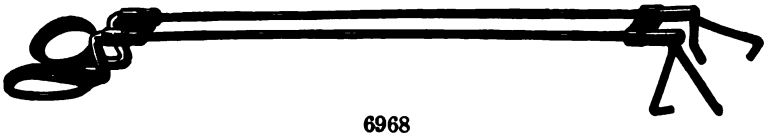


6966



6968

6960. **TONGS—Crucible, wrought iron, double bent with elbow; 28 inches long** **4.00**

6962. **TONGS—Cupel, steel,** light curved flat ends; 30 inches long **1.75**

6964. **Ditto**—with rounded ends **1.75**

6966. **TONGS—Scorifier, steel spring,** light; 30 inches long **2.00**

6968. **TONGS—Scorifier, Judson,** to lift out scorifiers from rear of muffle, without disturbing those in front; 25 inches long **3.50**

6974. **TOWELLING—Laboratory** ..... **per yard** **.55**
per bolt of about 60 yards **30.00**

TRANSITE—see **Asbestos Wood.**

6978. **TRAY—Photo, glass,** clear or amber.

Size outside, inches	4x5	5x8	7x9	8x10
Each	.35	.50	.80	1.00

6981. **TRAY—Steel,** white enamelled.

Inside dimensions, inches	5x7	7x9	8x10	10x12
Each	1.00	1.45	1.75	2.35

6982. **TRIANGLE—Iron,** plain. For cut, see next page.

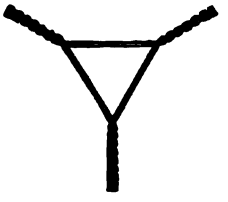
Length of sides inside, cm.	4	5	6
Each	.06	.07	.08
Dozen	.65	.75	.85

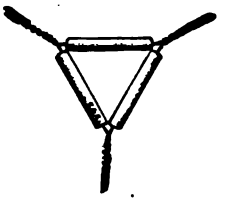
6984. **TRIANGLE—Pipestem covered.** For cut, see next page.

Length of sides inside, cm.	4	5	6
Each	.12	.14	.15
Dozen	1.20	1.40	1.50

6985. **Ditto—Porcelain covered.**

Length of sides inside, cm.	4	5	6
Each	.20	.25	.30
Dozen	2.00	2.50	3.00


6982
6988–90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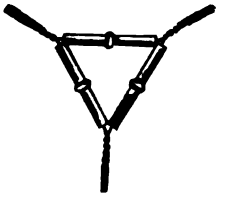
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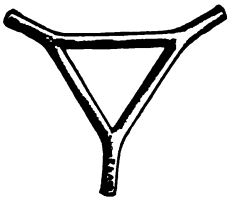

6996

6986. TRIANGLE—Pipestem covered, projections on the side, allowing flame to reach the crucible on all sides.

Length of sides inside, cm.	5	6.5	7.5
Each	.15	.17	.19
Dozen	1.50	1.70	1.90

6987. Ditto—Porcelain covered.

Length of sides inside, cm.	5	6.5	7.5
Each	.25	.30	.35
Dozen	2.50	3.00	3.50

6988. TRIANGLE—Pure nickel wire.

Length of sides inside, cm.	4	5	6.5	7.5	10
Each	.20	.25	.30	.35	.50

6990. TRIANGLE—Nickel Chromium, wire; a most satisfactory inexpensive substitute for platinum triangles. Of very high melting point, non-oxidizing, and practically unaffected by acids.

Length of sides inside, cm.	4	5	6.5	7.5
Each	.28	.28	.40	.40

6992. TRIANGLE—Fused Silica, "Vitreosil," on nickel wire.

Length of side, cm.	4	5	6	6.5	7.5	10
Each	.33	.33	.42	.50	.58	.75

6994. TRIANGLE—Fused Silica, American make, on Ni-chrome wire.

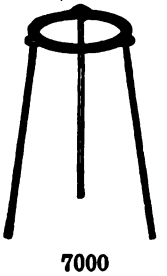
Length of side, cm.	4	5	6	6.5	7.5
Each	.40	.40	.50	.55	.65

6994/1. Ditto—"Vitreosil"	.50	.50	.60	.70	.80

6996. TRIANGLE—Fused Silica, All Silica, American make.

Length of side, cm.	4	5	6	6.5	7.5
Each	.90	.90	1.05	1.05	1.35

6996/1. Ditto—"Vitreosil"	1.50	1.50	1.75	1.75	2.00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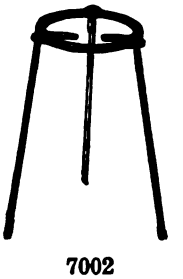
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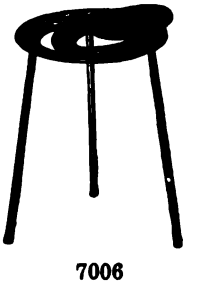

7006

7008

7000. TRIPOD—Iron, Bunsen, round top.

Height, inches	5	7	9
Outside diameter, inches	3½	3½	4½
Each	.20	.25	.30

7002. TRIPOD—with 3 projections, serving as a crucible support; height 9 inches, diameter outside 4½ inches .....

7010

7012

7014

7016

7004. **TRIPOD—with wide rim,** without rings; height 9 inches.

Outside diameter, inches	5	6¼	7¾	9½	12
Each	.25	.35	.40	.50	.80

7006. **TRIPOD—with wide rim and concentric rings;** height 9 inches. For cut, see preceding page.

Outside diameter, inches	5	6¼	7¾	9½	12
Number of rings	2	3	4	5	6
Each	.35	.50	.70	1.00	1.30

7008. **TRIPOD—Height adjustable,** inside diameter 4 inches; height when drawn out to extreme, 16 inches. For cut, see preceding page 3.00

7010. **TRIPOD—Iron, triangular top,** height 9 inches.

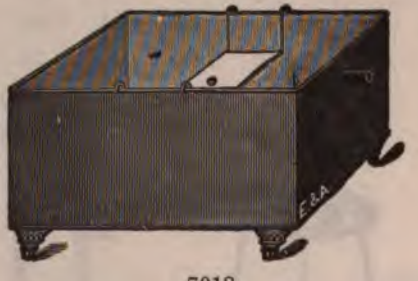
Length of sides, inches	5	6	8	10
Each	.60	.75	.90	1.20

7012. **TRIPOD—Iron, heavy,** with plate and removable feet; diameter 11 inches, height 7½ inches 1.00

7014. **TRIPOD—Iron, with adjustable lamp bracket,** diameter 6½ inches, height 9 inches.. 1.15

7016. **TRIPOD—Iron, with chimney combined,** protecting the burner flame from draughts; height over all, 9 inches.

Diameter, inches	3½	5	6
Each	1.20	1.45	1.80



7018

7022

7018. **TROUGH—Pneumatic, japanned zinc,** with sliding shelf and overflow tube.

Size, inches	4x7x10	5x9x12	6x11x15	8x12x18	12x12x16
Each	1.75	2.00	2.80	3.50	4.00

7020. **TROUGH—Stoneware,** acid and alkali proof, well glazed.

Size, inside, inches...	12x9x9	12x12x12	16x16x12	20x16x12	20x16x16	24x20x20
Capacity, gallons	4	7	13	16	22	41
Each	13.50	20.00	26.00	30.00	40.00	60.00

7022. **TROUGH—Glass,** heavy.

Size, inches	5x3x6	5¼x4x8	5½x5x10½	5¾x6x12½	6x7x14½
Each	3.00	5.00	7.00	10.00	13.00

7024

7026

7030

7024. **TROUGH—Mercury, porcelain, cross form;** capacity six pounds of mercury **1.75**

7026. **TROUGH—Mercury, porcelain, usual form,** for 8 pounds **1.90**

7028. **Ditto**—for 16 pounds **3.00**

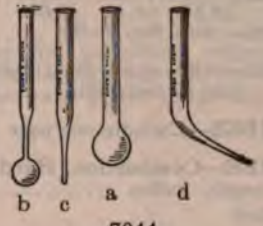
7030. **TROUGH—Beehive shelf,** of glass; for supporting inverted vessels in the pneumatic trough.

Diameter, inches	3	4
Each	.80	1.00

7034

7036

7038



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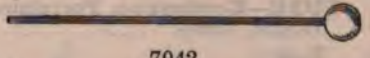


7042

7046

Tubes

For Glass Tubing Soft and Hard, see pages 304 and 305

7034. **TUBE—Absorption, Babo,** filled with glass beads **2.20**

7036. **TUBE—Absorption, Emmerling,** filled with glass beads **2.20**

7038. **TUBE—Absorption, Camp,** length of body 13 inches, diameter $1\frac{1}{16}$ inches **3.30**

7040. **TUBE—Alundum,** for high temperature electric furnace work.

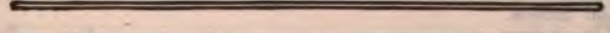
Bore, inches	¾	1	1⅛	1¼	1½	1¾	2
Thickness of wall, inches	⅛	⅛	$\frac{3}{16}$	$\frac{3}{16}$	¼	¼	⅜
Length 12 inches ..... each	2.30	2.30	2.88	2.88	3.45	4.03	4.60
Length 18 inches ..... each	3.45	3.45	4.32	4.32	5.18	6.04	6.90
Length 24 inches ..... each	4.60	4.60	5.75	5.75	6.90	8.05	9.20

7042. **TUBE—Air thermometer.**

Diameter, inches	1	1½	2	2½	3
Each	.30	.40	.45	.60	.90

7044. **TUBE—Arsenic,** of resistance glass; any shape, a, b, c, or d ..... dozen **1.00**

7046. **TUBE**—of combustion tubing, with constriction; 15 inches long ..... each **.35**



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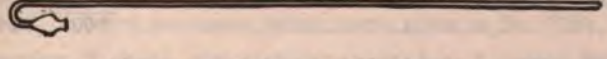


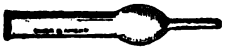
7050

7048. **TUBE—Barometer, straight,** one end closed; 36 inches long ..... **.75**

7050. **Ditto**—with reservoir **1.00**

7060

7062



7052

7054

7056

TUBES—Bulb, see Reduction tubes.

TUBES—Bulb, Meyer, see Nos. 6528 and 6530.

7052. **TUBE—Calcium Chloride,** with one bulb.

Length, to bottom of bulb, inches	3	4	5	6	8	10
Each	.14	.15	.16	.17	.24	.26

7054. **Ditto**—with two bulbs ..... each	.16	.17	.18	.20	.26	.36
7056. **Ditto**—with small inner tube to collect moisture in first bulb ..... each	.22	.24	.28	.36	.44	

TUBES—Carbon, see page 171.

7060. **TUBE—Combustion, Hard glass,** one end drawn to a point; ½ inch bore.

Length, inches	12	14	16	18	20	24	30
Each	.24	.27	.33	.38	.45	.55	.80

For **Glass Combustion Tubing,** see page 305.

7062. **TUBE—Combustion, Porcelain, glazed inside,** flanged ends; bore ½ inch.

Length, inches	12	20	25	30
Each	4.20	7.00	8.75	10.50

7064. **Ditto**—Bore ⅝ inch ..... each	4.20	7.00	8.75	10.50
7066. **Ditto**—Bore ¾ inch ..... each	5.40	9.00	11.25	13.50
7068. **Ditto**—Bore 1 inch ..... each	5.40	9.00	11.25	13.50
7070. **Ditto**—Bore 1½ inch	....	....	12.50	....
7072. **Ditto**—Bore 2 inches ..... each	7.20	12.00	....	18.00

7074. **TUBE—Combustion, Porcelain, glazed inside and outside;** especially suitable for use at high temperatures.

Length, inches	24	48	48	24	48	24	48	48
Diameter, inside, inches	¼	½	11/16	1	1⅛	1¼	1⅜	1¾
Each	8.40	16.80	21.60	10.80	22.80	12.00	26.40	30.00

7075. **TUBE—Fused Silica, American make, glazed inside only,** gas tight, length 24 inches.

Diameter inside, inches	½	⅝	¾	⅞	1	1⅛
Each	3.00	3.50	4.20	4.60	5.00	5.50

7075/1. **Ditto**—length 30 inches.

Diameter inside, inches	¾	⅞	1	1⅛
Each	5.25	5.75	6.25	6.88

7075/2. **Ditto**—length 36 inches.

Diameter inside, inches	¾	⅞	1	1⅛
Each	6.30	6.90	7.50	8.25

7077. **TUBE—Fused Silica, Vitreosil, glazed inside only,** excellent quality, length 24 inches.

Diameter inside, inches	½	⅝	¾	⅞	1	1⅛
Each	4.00	4.40	5.60	6.10	6.70	7.10

7077/1. **Ditto**—length 30 inches.

Diameter inside, inches	¾	⅞	1	1⅛
Each	7.00	7.63	8.38	8.88

7077/2. **Ditto**—length 36 inches.

Diameter inside, inches	¾	⅞	1	1⅛
Each	8.40	9.15	10.05	10.65

7079

7078. **TUBE—Fused Silica, "Vitreosil," glazed inside and outside,** absolutely gas tight, uniform bore and ends quite round, so that tight joint can be easily made with stopper; length 24 inches.

Diameter inside, inches	¾	⅞	1	1⅛
Each	**6.90**	**7.40**	**8.70**	**9.10**

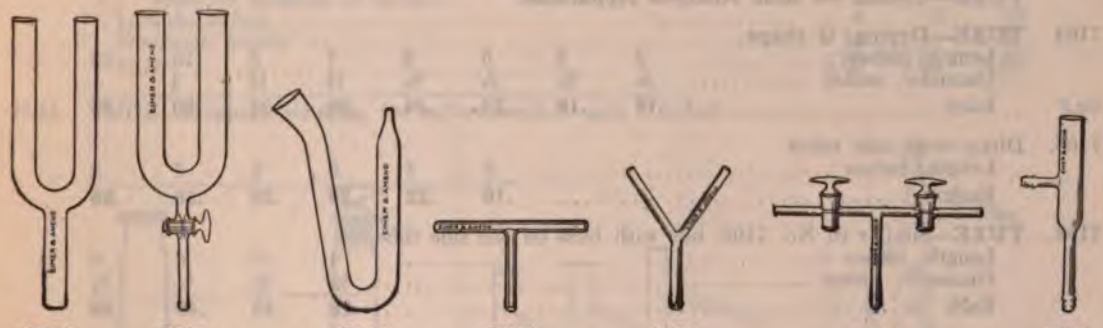
7078/1. **Ditto**—length 30 inches.

Diameter inside, inches	¾	⅞	1	1⅛
Each	**8.63**	**9.25**	**10.88**	**11.38**

7078/2. **Ditto**—length 36 inches.

Diameter inside, inches	¾	⅞	1	1⅛
Each	**10.35**	**11.10**	**13.05**	**13.65**

7079. **TUBE—Combustion, Fused Silica with transparent section,** permitting progress of operation to be observed without difficulty. Tubes can be supplied with the transparent section located in any part of the tube. Silica tube glazed inside and outside. To order only.



7080 7082 7084 7086 7088 7094 7096

7080. **TUBE—Connecting, U shape.**

Length of limb, inches	3	4	5	6	8
Diameter, inches	¼	⅜	⅝	¾	1
Each	**.18**	**.25**	**.35**	**.50**	**.75**

7082. **Ditto—with stopcock** on outlet.

Length of limb, inches	5	6	8
Diameter, inches	⅝	¾	1
Each	**2.20**	**2.40**	**2.75**

7084. **TUBE—V shape,** as illustrated.

Height, inches	6	8	10	12
Diameter, inches	¾	1	1⅛	1¼
Each	**.70**	**.85**	**1.00**	**1.35**

7086. **TUBE—T shape.**

Diameter inside, in.	⅛	3/16	¼	5/16	⅜	⅝	¾	⅞	1
Each	**.12**	**.14**	**.16**	**.18**	**.30**	**.45**	**.60**	**.80**	**.90**

7088. **TUBE—Y shape,** same prices as No. 7086.

7090. **TUBE—T shape,** of heavy barometer tubing.

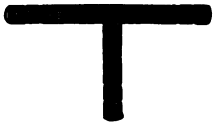
Diameter outside, inches	3/16	¼	⅜
Each	**.30**	**.35**	**.50**

7092. **TUBE—Y shape,** of heavy barometer tubing, same prices as No. 7090.

7094. **TUBE—Connecting, T shape, with two stopcocks;** bore 2 mm. **4.00**

7096. **TUBE**—To connect supply pipe with two burners; bore of outlets ¼ inch ..... **.55**

7098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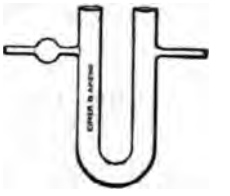
7104

7106


7108

7098. **TUBE**—To connect one large pipe and two small ones.

Bore of large end, inches	¼	⅜	½	⅝	¾	1
Bore of small end, inches	⅛	3/16	¼	¼	5/16	⅜
Each	.25	.30	.40	.50	.60	.80

7100. **TUBE—Connecting, Brass, T shape.**

Diameter outside, inches	3/16	¼	⅜	½	¾	1
Each	.45	.50	.60	.75	1.10	1.40

7102. **Ditto—Y shape,** same prices as No. 7100.

TUBE—Cream, see **Milk Analysis Apparatus.**

7104. **TUBE—Drying, U shape.**

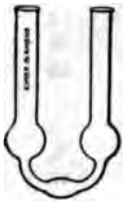
Length, inches	3	4	5	6	7	8	10	12
Diameter, inches	7/16	½	9/16	⅝	13/16	13/16	1	1
Each	.16	.18	.21	.24	.30	.35	.50	.75

7106. **Ditto**—with side tubes.

Length, inches	3	4	5	6	7	8
Each	.18	.22	.28	.32	.35	.55

7108. **TUBE**—Similar to No. 7106, but with bulb on one side tube.

Length, inches	4	5	6	8
Diameter, inches	½	⅝	¾	⅞
Each	.28	.35	.40	.60


7110

7112

7114

7116

7110. **TUBE—Pelligot,** with 3 bulbs.

Length, inches	3	4	5	6	7	9
Diameter, inches	7/16	½	9/16	11/16	⅞	1
Each	.32	.38	.45	.50	.65	.90

7112. **TUBE—Drying, Marchand,** with cork and connecting tube.

Length, inches	4	5	6
Each	.35	.40	.55

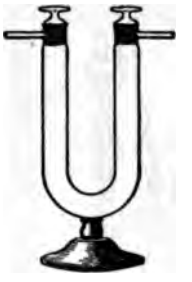
7114. **Ditto**—with permanent side tube.

Length, inches	4	5	6
Each	.35	.40	.55

7116. **TUBE—Drying, Muencke,** with bulb at bottom to collect moisture.

Length of limb, inches	6	8
Each	.50	.85

7118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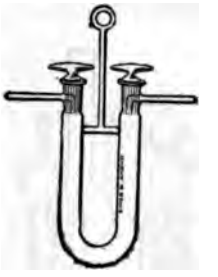
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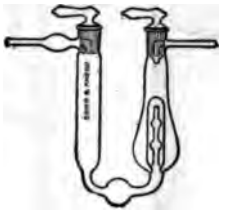

7124

7118. **TUBE—Drying, Schwartz,** with side tubes and perforated glass stoppers well ground in.

Length, inches	4	5	6
Diameter, inches	½	11/16	¾
Each	1.80	2.00	2.20

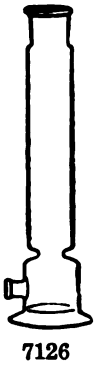
7120. **Ditto**—with side tubes and perforated glass stopper; supported on wooden foot.

Length, inches	8	12
Each	3.30	4.40

7122. **TUBE—Drying, McIntire,** with side tubes, perforated glass stoppers and glass rod attachment for hanging on balance.

Length, inches	4	5	6
Diameter, inches	½	11/16	¾
Each	3.00	3.30	3.80

7124. **TUBE—Drying, Schmitz,** for sulfuric acid; length 6 inches 5.00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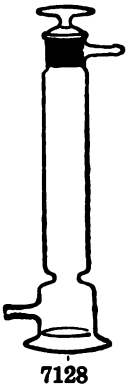
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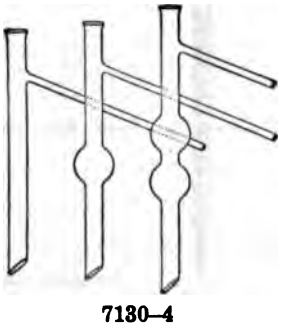
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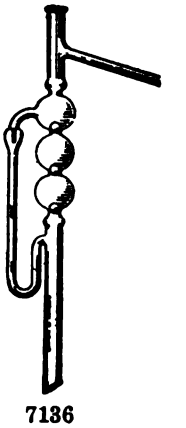

7136

7126. **TUBE—Drying or Calcium Chloride Jar,** on foot, with tubulature near bottom.

Height, inches	8	10	12	16	18	24
Each	1.80	2.00	2.75	3.30	4.00	8.00

7128. **TUBE—Drying or Calcium Chloride Jar,** with perforated ground in glass stopper and side tube.

Height, inches	8	10	12	16	18
Each	5.00	5.50	6.00	9.00	12.00

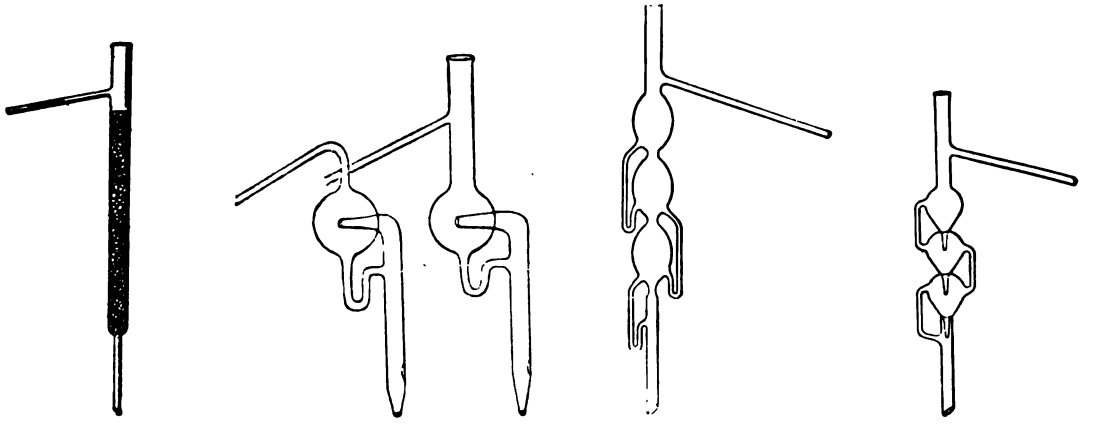
7130. **TUBE—Fractional Distillation,** total length 6 inches ..... .30

7132. **Ditto**—with one bulb, length 8 inches from bottom of bulb to top of neck ..... .45

7134. **Ditto**—with two bulbs, length 9 inches from bottom of lower bulb to top of neck ..... .55

7136. **TUBE—Fractional Distillation, Glinsky,** with glass valves.

Size	Small	Medium	Large
Length over all; inches	12	14	16
Each	2.00	2.25	2.50

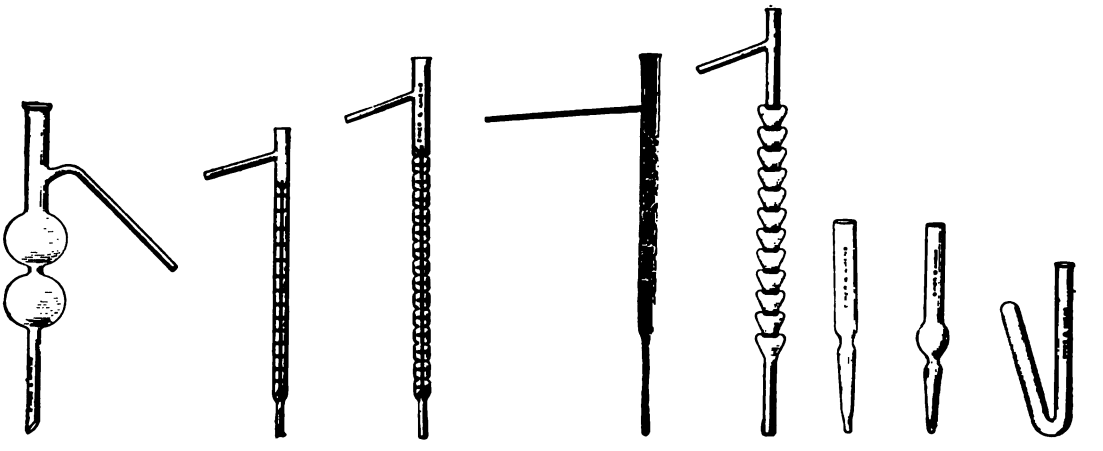


7138 7140 7142 7144 7146

7138. **TUBE—Fractional Distillation, Hempel,** Tube only **1.10**
7138a. **Glass beads**—for above, per pound **3.50**
7140. **TUBE—Fractional Distillation, DeKoninck** **1.50**
7142. **Ditto**—with neck **1.65**
7144. **TUBE—Fractional Distillation, Lebel-Henninger.**

Number of bulbs	2	3	4	5	6
Each	1.50	1.75	2.50	3.60	4.20

7146. **TUBE—Fractional Distillation, Norton & Otto,** 14 inches long **2.25**



7148 7150 7152 7153 7156 7158 7160 7162

7148. **TUBE—Fractional Distillation, Wurtz,** with 2 bulbs.

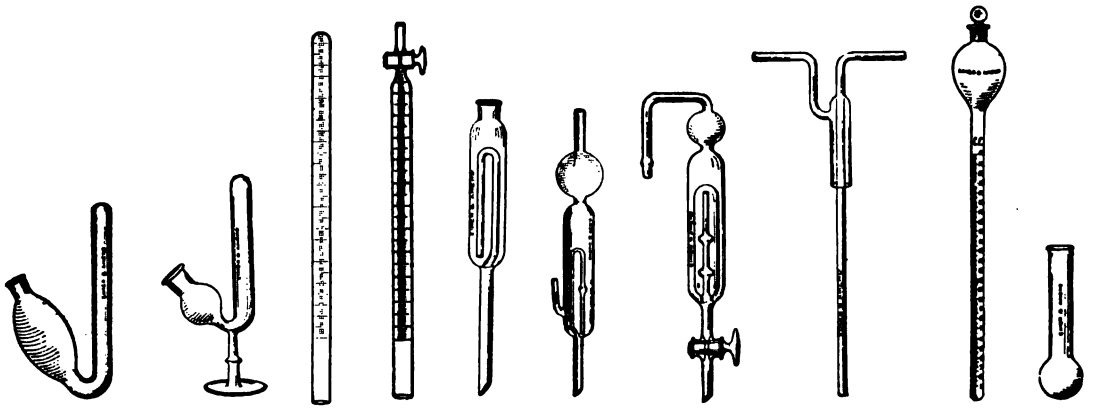
Size	Small	Medium	Large
Diameter of bulbs, inches	1½	1¾	2
Each	1.40	1.50	1.65

7150. **TUBE—Fractional Distillation, Young** (Trans. Chem. Soc., 1899, p. 679), especially suited for the distillation of small quantities; rod and disc still head with 15 discs.. **2.20**
7152. **Ditto**—with 20 discs and 21 constrictions **3.30**
7153 **TUBE—Fractional Distillation, Vigreux.**

Length, inches	8	16	24
Each	2.50	4.00	8.00

7154. **TUBE—Fractional Distillation,** Pear still head, with 4 pears **1.50**
7156. **Ditto**—with 12 pears, dephlegmatisator **4.00**
7158. **TUBE—Filtering, Fresenius,** for filtration with glass wool or asbestos; length 6 inches, diameter of neck 9/16 inch ..... **.25**
7160. **Ditto**—with bulb, length 6½ inches, diameter of neck ⅝ inch ..... **.30**
TUBE—Filtering, "Carbon Filters," for Gooch crucibles, see Funnels.
7162. **TUBE—Fermentation, Smith,** without bulb.

Length, inches	5	7
Each	.20	.30
Dozen	2.00	3.00



7164 7166 7168 7170 7176–8 7180 7182 7186 7188 7190

7164. **TUBE—Fermentation, Smith,** with bulb.

Length, inches	5	7
Each	.30	.35
Dozen	3.00	3.50

7166. **Ditto**—on glass foot.

Total height inches	5	7
Each	.35	.45
Dozen	4.00	5.00

Fermentation Tube Support—see No. 6696.

7168. **TUBE—Gas Measuring, Bunsen.**

Capacity, cc.	25	50	50	100	200
Graduated to, cc.	1/10	1/5	1/10	1/5	1/1
Each	.90	1.00	1.25	2.00	2.00

7170. **Ditto—with stopcock.**

Capacity, cc.	50	100	100
Graduated to, cc.	1/10	1/5	1/10
Each	3.30	3.80	4.40

TUBE—Goetz, Phosphorus, see Nos. 1858, 1860, 1923c and 1964c.

7176. **TUBE—Kemp,** capacity 100 cc. 1.20

7178. **Ditto**—capacity 175 cc. 1.65

7180. **TUBE—Gas Washing, Kjeldahl** 2.20

7182. **TUBE—Gas Washing, Muencke,** with stopcock 4.40

7184. **Ditto**—without stopcock 2.50

7186. **TUBE—Gas Washing, Vogel** ..... .50

7188. **TUBE—For measuring phenols,** according to Bureau of Animal Industry, Bulletin No. 107 of U. S. Dept. of Agriculture. The tapering tube below the bulb has a capacity of about 25–30 cc., and is graduated to contain 25 cc. in 1/10ths at 20° C. 2.00

7190. **TUBE—Ignition,** of hardest glass; with bulb.

Length, cm.	10	12	15	18	20
Each	.20	.25	.36	.45	.55

7192. **TUBE**—of cast iron, without bulb; 3½ inches long by ½ inch inside diameter ..... .60

TUBES—Kjeldahl, see Bulbs.

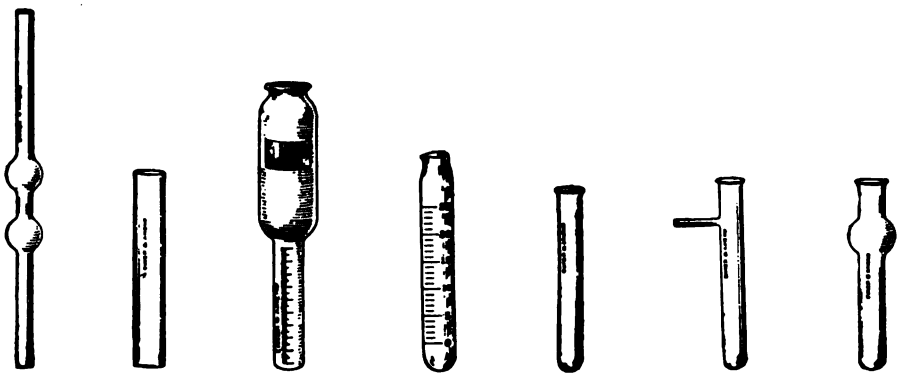
TUBE—Melting Point, Thiele, of hard glass, see No. 4336.

TUBES—Milk, see Milk Analysis Apparatus.

TUBES—Nessler, see Jars.

7200. **TUBE—Pyrometer, Fused Silica,** closed at one end; in lengths up to 5 feet.

Bore, inch	⅛	3/16	¼	⅜	½	⅝	¾	1
Per foot	.76	1.14	1.52	2.02	2.40	2.75	3.55	4.35



7202 7208 7212 7214 7216 7218 7220

7202. **TUBE—Reduction,** of hard glass.

With bulbs	1	2	3
Each	.40	.60	.75

7204. **TUBE—Similar** to above, but of soft glass.

With bulbs	1	2	3
Each	.32	.40	.60

7208. **TUBE—Specimen,** heavy glass, flat bottom. Corks to fit are charged extra. Outside measurements are given.

Length, inches	2	2	2	2	3	3	3	3	4	4
Diam., inches.	¼	½	⅝	¾	⅜	½	⅝	¾	½	⅝
Per dozen.....	.20	.25	.19	.26	.20	.26	.27	.28	.27	.29
Per gross.....	2.00	2.50	1.90	2.65	2.00	2.60	2.70	2.80	2.70	2.90
Length, inches	4	4	5	5	5	5	6	6	6	8
Diam., inches.	¾	1	½	⅝	¾	1	⅝	¾	1	1
Per dozen.....	.31	.44	.31	.33	.34	.46	.34	.35	.50	.60
Per gross.....	3.10	4.40	3.10	3.35	3.40	4.60	3.40	3.50	5.00	6.00

7210. **TUBE—Specimen, round bottom,** same prices and dimensions as No. 7208.

Ditto—with screw caps, see Bottles.

TUBE—Specific Gravity, see Bottles.

TUBE—Spectrum, see Spectroscopes.

7212. **TUBE—Sugar and syrup, Hortvet** (see Bulletin 107, U. S. Dept. of Ag. Bureau of Chemistry), for the determination of lead precipitates ..... .80

7214. **TUBE—Sugar, Vivien,** for estimating alkalinity of beet sugar juices ..... .70

7216. **TUBE—Test, Resistance glass,** well annealed, free from lead.

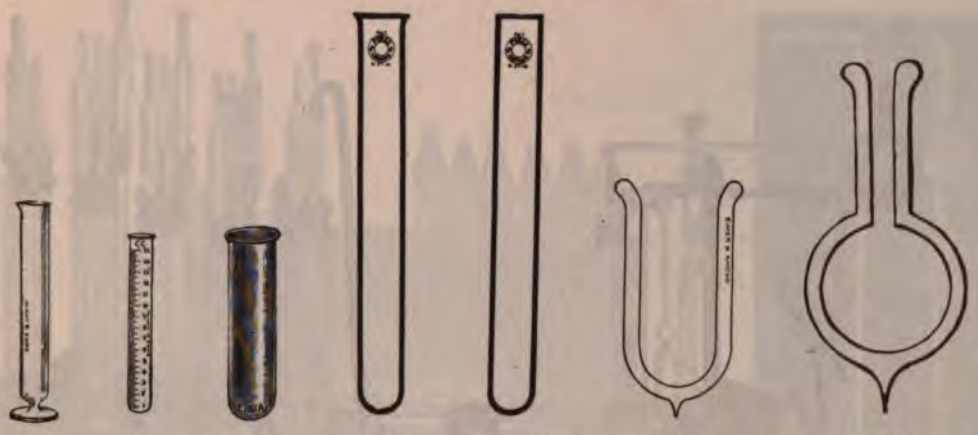
Size, inches	3x⅜	4x½	4x⅝	5x½	5x⅝	6x½	6x⅝	6x¾
Per dozen	.30	.33	.39	.37	.40	.42	.44	.46
Per gross	3.00	3.30	3.90	3.75	4.00	4.25	4.40	4.60
Size, inches		7x¾	7x⅞	7x1	8x1	10x1	10x1¼	12x1
Per dozen		.70	.80	.90	1.00	1.30	3.50	2.50
Per gross		7.00	8.00	9.00	10.00	13.00	35.00	25.00

7218. **TUBE—Test, with side neck.**

Size, inches	4x½	5x⅝	6x¾	8x1	10x1⅛
Per dozen	1.30	1.40	1.60	2.00	3.60

7220. **TUBE—Test, with bulb,** prevents boiling over; may be laid on the table without contents overflowing.

Size, inches	5x⅝	6x¾
Per dozen	1.75	2.00



7222 7224 7225 7233 7233/2 7236 7240

7222. **TUBE—Test,** of foot.

Size, inches	4x½	5x¾	6x1	10x1⅛
Per dozen	**1.80**	**2.00**	**2.40**	**5.40**

7224. **TUBE—Test,** graduated.

Capacity, cc.	5	10	15	25
Graduated to, cc.	1/10	1/10	1/5	1/2
Each	**.35**	**.45**	**.45**	**.55**

TUBES—Wasserman, see Specimen Tubes, No. 7210.

7225. **TUBE—Titer,** for determining the solidification points of fats and waxes.

Size, inches	4x1	3x1
Per dozen	**1.80**	**1.50**

7233. **TUBE—Test, light wall, Pyrex glass, with lip.**

Outside diameter, mm.	100x12	125x15	150x16	150x18	200x25	250x25
Each	**.07**	**.09**	**.11**	**.12**	**.25**	**.36**

7233/1. **TUBE—Test, light wall, Pyrex glass, without lip.**

Outside diameter, mm.	100x12	125x15	150x16	150x18	200x25	250x25
Each	**.06**	**.08**	**.10**	**.11**	**.24**	**.34**

7233/2. **TUBE—Test, heavy wall, "Ignition Tubes," Pyrex glass.**

Outside diameter, mm.	100x14	125x16	150x20	200x25
Each	**.11**	**.13**	**.22**	**.34**

7236. **TUBE—Vacuum, Dewar,** double wall, for liquid air experiments; **silvered.**

Length outside, mm.	100	200	300	350
Diameter outside, mm.	45	55	65	90
Each	**7.50**	**8.25**	**17.50**	**25.00**
7238. **Ditto—plain**	**7.00**	**7.75**	**17.00**	**24.25**

7240. **TUBE—Dewar Vacuum Flask,** double wall, for storing and shipping liquid air; **silvered.**

Capacity, liters	¼	½	1	2	4
Each	**7.50**	**8.50**	**15.00**	**22.50**	**35.00**
7242. **Ditto—plain**	**7.00**	**8.00**	**14.25**	**21.75**	**34.00**

FLEXIBLE

7245

7245. **TUBING—For distillation,** as used in Fertilizer Laboratories. Consists of 10″ length of $\frac{3}{16}$″ Bronze Hose to one end of which is soldered a 48″ length of seamless copper tubing $\frac{13}{32}$″ o.d. by .025 gauge. On the other end of the Bronze Hose, also by means of a ferrule, is soldered a 6″ length of ¼″ Iron Pipe size Seamless Brass Tubing bent to a 45° angle **7.50**

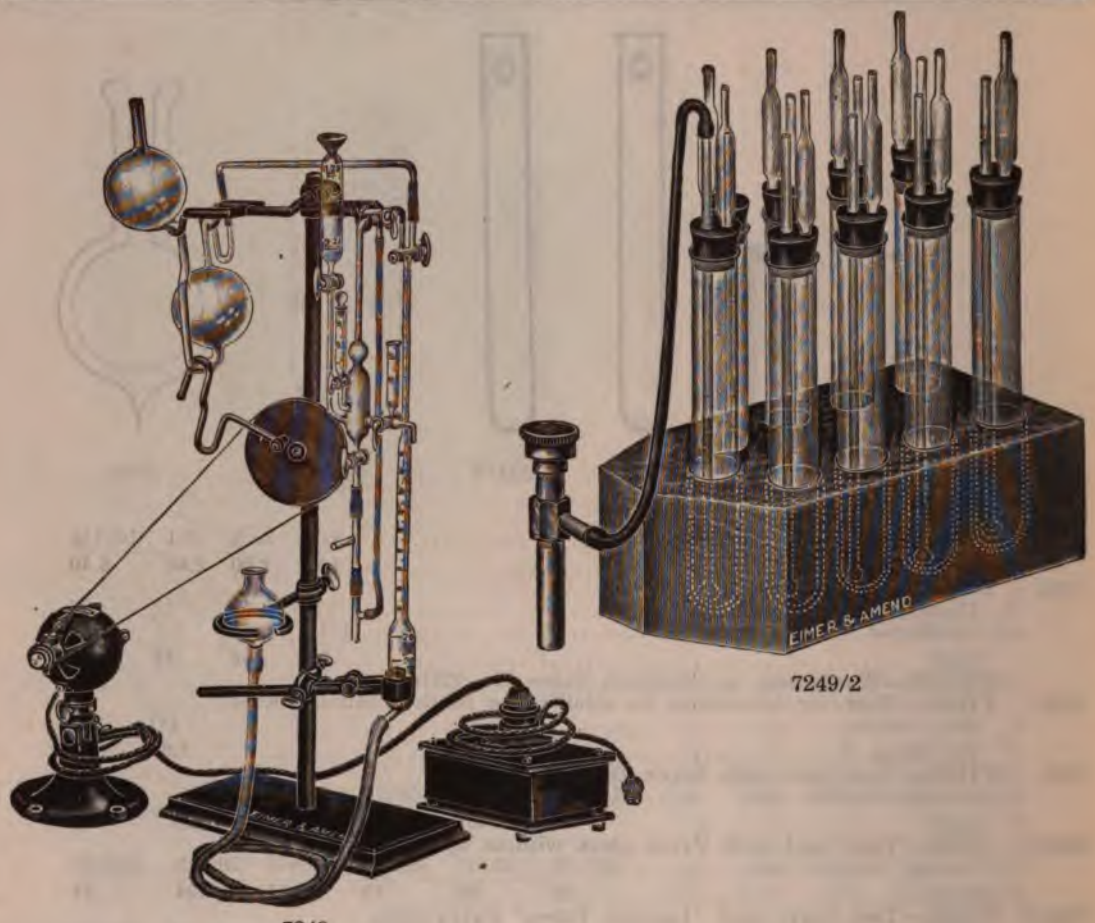
TUBING—Glass, see Nos. 3730–3741.

Ditto—Rubber, see Nos. 6046–6068.

Ditto—Metallic, see Nos. 5218, 5220 and 6070.

Turbidimeter—Jackson, for determining sulfates in water analysis, etc.; see No. 6532.

Turbidimeters—U. S. Geol. Survey, see Nos. 2132–2136



7249/2

7249

Van Slyke Apparatus

For the Gasometric Determination of Aliphatic Amino Groups. See Journal of Biological Chemistry, XII, p. 275, 1911 and XVI, p. 121, 1911. The apparatus permits analysis of any volume of solution up to 10 cc. and gives results with an accuracy of 1/20th mg. of nitrogen. This method has been applied to various problems, among which are the study of protein digestion, both in vitro and in vivo; the determination of the nature of the amino acids yielded by hydrolysis of small amounts of protein; the determination of free amino groups in fixing the constitution of various organic substances; and the determination of amino acid nitrogen in urine, blood and tissues.

7249.	**APPARATUS**—mounted complete on stand with electric motor, shaking wheel, clamps, holders and rubber tubing	84.00
7249/1.	**Ditto—small size,** so-called **Micro Apparatus**	84.00
7249B.	**Glass parts**—for 7249	40.00
7249C.	**Glass parts**—for 7249/1	40.00
7249D.	**Deaminizing vessel**—for either size	27.00
7249E.	**Burette**—for either size	7.75
7249G.	**Pipette**—for either size	3.25
	Motor—E. & A. Universal for 110 or 220 volts, complete with control rheostat, operates at any desired speed and at any angle, see No. 4637/1.	
7249/2.	**VAN SLYKE-CULLEN APPARATUS**—For the determination of Urea in Urine or Blood. See Journal of Biological Chemistry, XIX, p. 211, 1914. The apparatus consists of a heavy wooden block, with 9 heavy test tubes fitted with rubber stoppers, connecting tubes and filter pump. Complete	18.75
7249K.	**Test tubes**—for 7249/2 ..... each	.30
7249L.	**Folin Ammonia Tubes,** for 7249/2 ..... each	.55
7249M.	**Connection tubes**—for 7249/2 ..... each	.15
7249N.	**Arlco Urease**—10 gr. bottle, for 7249/2	1.25

7249/3

7249/5

7249/11

7249/3. **VAN SLYKE APPARATUS**—For the determination of Carbon Dioxide in Blood Plasma and other solutions. This determination furnishes at present the most reliable practical index of the state of the blood in conditions of acidosis, such as occur in diabetes, nephritis, etc.; glass part only **16.75**

7249/3A. **Ditto—mounted on stand,** with clamp, ring and levelling bulb **20.00**

7249/3B. **Ditto—complete on stand,** with clamp, ring, levelling bulb, rubber tube, separatory funnel and two pipettes **29.00**

7249/4. **Ditto—small size, unmounted** **22.50**

7249/4A. **Ditto—mounted** **29.00**

7249/5. **ACIDOSIS OUTFIT**—for determining Alkali Reserve of Blood **6.50**

7249/6. **ACIDOSIS OUTFIT**—for determining Alveolar Air CO_2 tension, with bag, bulb and pinchcock **8.50**

7249/7. **ACIDOSIS OUTFIT**—for determining Combination Alkali Reserve and Alveolar Air; with bag, bulb and pinchcock **12.50**

7249/8. **ACIDOSIS OUTFIT**—for determining hydrogen ion concentration of Blood **8.50**

7249/9. **BLOOD CULTURE VACUUM TUBE**.....dozen **5.50**

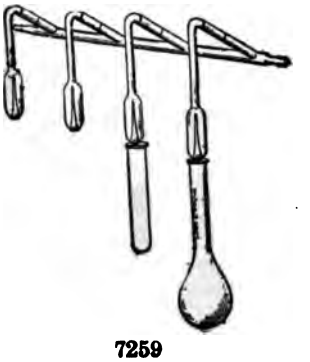
7249/10. **DIALYZING TUBE**—for hydrogen ion determination .....dozen **.50**

7249/11. **FREDERICIA APPARATUS**—for the determination of Carbon Dioxide in Alveolar Air. Mounted on vulcanite board. Description sent on request **15.75**

For **air and blood testing apparatus,** see Bacteriological Catalog, Section I.

For **Colorimeters** to use with above, see Colorimeters; also Bacteriological Catalog, Section I.

7250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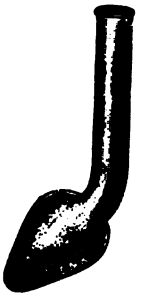
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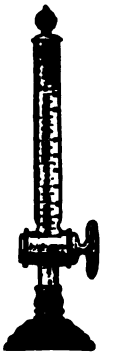

7264

Urine Analysis Apparatus

7250. **OSTWALD PIPETTE**—For determining total nitrogen and Ammonia in Urine, as described by Dr. O. Folin in Journal of Biol. Chem., Vol. XI, 1912.

Capacity, cc.	½	1	2	3	4	5	6	7
Each	.65	.65	.75	.80	.85	.90	.95	1.00
Capacity, cc.		8	9	10	12	20	25	50
Each		1.05	1.10	1.15	1.20	1.35	1.40	1.80

7253. **Ditto**—½ cc. capacity, with tip slightly bent, for use with Gulick method. See No. 7263. .65

Micro Burner—see No. 1506.

7259. **APPARATUS**—For absorption of fumes, for use with test tubes, flasks, etc.

Complete with absorbers	1	2	3	4
Each	1.30	2.35	3.90	5.30

7259a. **Absorbers**—only ..... each .65

7259b. **Beam**—only, for absorbers

	1	2	3	4
Each	.75	1.25	2.20	3.20

7260. **TEMPERATURE INDICATOR—Mercury Chloride-Iodide bulbs** ..... each .30

7262. **CALCIUM CHLORIDE TUBE**—without bulb, 25 x 1.5 cm. ..... each .40

7263. **MICRO-OXIDATION FLASK—Gulick,** with bulb of 15 cc. capacity as described in the Journal of Biological Chemistry, Vol. XVIII, No. 3, August, 1914. "A Simplification of the Determination of Total Nitrogen by colorimetry" ..... each .45

7264. **PURINOMETER—Hall,** an apparatus for controlling the assimilation of nitrogenous food in the body, with directions ..... each 21.00

a. **Test Solution No. 1** ..... per 200 cc. .90

b. **Test Solution No. 2** ..... per 200 cc. 1.00

7266

7268

7270

7274

7266. **ALBUMINOMETER—Esbach,** for the quantitative estimation of albumin ..... .90

7268. **Ditto—on glass foot,** with pointed bottom, for reading small quantities 1.10

7270. **ALBUMINOSCOPE—So-called Horismascope,** for the detection of albumin by nitric acid; very sensitive, indicating 1/60% of albumin 1.40

7272. **AMMONIA ABSORPTION APPARATUS—Folin,** complete with high cylinder fitted with rubber stopper, drying tube and bottle; with special ammonia tube..... 3.25

7274. **Ammonia tube only**—for No. 7272 ..... 1.90

CENTRIFUGE—Electric, water or hand power, see Centrifuges.

7276 7280 7282 7284

7276. **SACCHAROMETER—Einhorn Fermentation,** for the estimation of sugar in urine .. **.90**

7278. **Ditto—set of two,** one for the urine to be examined, and the other for normal urine to which a small quantity of glucose has been added, to test the efficiency of the yeast used; with graduated test tube **1.80**

7280. **SACCHAROMETER—Einhorn,** with glass stopcock for easy filling **2.80**

7282. **SACCHAROMETER—Lohnstein,** for the exact determination of sugar in urine; complete in box with bottle of mercury and instructions **2.80**

7284. **SACCHAROMETER—Ultzmann,** an optical instrument; for the quantitative estimation of sugar in urine, reading direct percentage of sugar from 0–10%; in case with one tube **60.00**

a. **Support** .....**extra** **10.00**

FERMENTATION TUBES—see Nos. 7162–7166.

7288 7290 7292 7294 7298

7286. **UREA APPARATUS—Folin,** for the determination of urea in urine; consisting of flask with rubber stopper and special urea bulb **1.50**

7288. **Urea bulb**—only for above **1.20**

7290. **UREA APPARATUS—Squibb;** complete with directions **1.75**

7292. **UREOMETER—Doremus,** for the rapid estimation of urea in urine by sodium hypobromite; in box with pipette **1.00**

7294. **Ditto**—on glass foot; in box with pipette **1.25**

7296. **UREOMETER—Doremus-Hinds,** gives closer results than the original form, as the 1 cc. of urine required for the test is delivered with greater accuracy, and no nitrogen escapes from the bulb **2.75**

7298. **Ditto**—on glass foot **3.00**

Solutions for above Ureometers

a. **Sodium Hydroxide**—including bottle .....**per lb.** **.65**
b. **Bromine**—including bottle .....**per ounce** **.35**

7300 7302 7304 7333

7300. **URICOMETER—Ruhemann,** for rapid estimation of uric acid; with directions 2.75

7302. **URINO-GLUCOSOMETER—Stern,** for determining the glucose in urine by difference in specific gravity after fermentation; complete in box with 2 special sensitive urinometers and 2 cylinders, respectively 50 cc. and 100 cc, having individual bases.. 9.00

7304. **URINO-PICNOMETER—Saxe,** for determination of specific gravity of small amounts of urine—about 3 cc. is all that is required; with cylinder and pipette 6.00

7310

7308. **UREOMETER—Bartley,** for the rapid determination of urea in urine; reagents required are solutions of potassium bromide, and chlorinated soda 1.25

7310. **Ditto—with Dr. Beebe's clamp** 2.00

7316. **URINOMETER—Standard quality,** sp. gr. scale 1.000 to 1.060; with cylinder in box.. 1.25

7318. **Ditto—with thermometer** combined; with cylinder in box 3.00

7320. **URINOMETER—Standard quality,** sp. gr scale 1.000 to 1.040; with cylinder in box, without thermometer 1.25

7322. **URINOMETER—Set of two,** sp. gr. scales 1.000 to 1.020, and 1.020 to 1.040; each with cylinder in separate box 2.50

7324. **URINOMETER—Small,** for 10–15 cc. urine; with cylinder in box 1.25

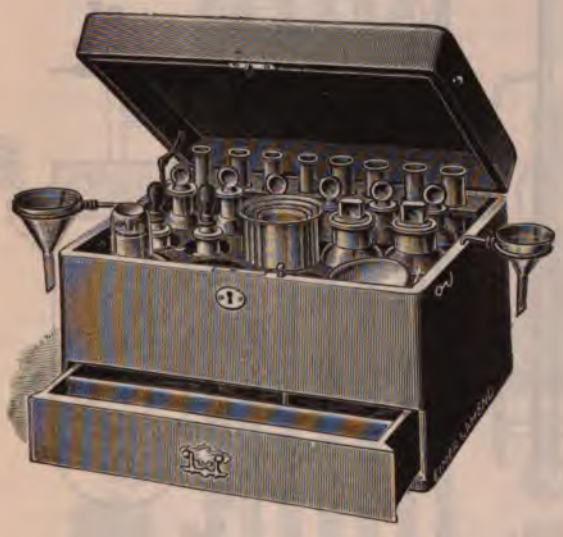
7326. **URINOMETER—Squibb,** sp. gr. scale 1.000–1.060; with cylinder and table of corrections 1.50

7328. **Ditto—with thermometer** separate 3.00

URINE GLASSES—Conical, tall form, with lip, see Nos. 6714–6716.

URINE SEDIMENTATION GLASSES—and urinometer cylinder combined, see No. 6720.

7333. **TUBE—Imhoff,** for determining the percentage of Sewage in water, 1 liter capacity, narrow end closed, end graduated to 1/10 cc. 4.25



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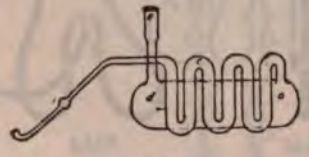
7340



7344

7338. **URINARY ANALYSIS SET**—In polished mahogany case, with drawer; size of case, 10¾x7½x6¾, containing:

- 6 Reagent Bottles, glass stoppered.
- 2 Reagent Bottles, with pipette stoppers.
- 2 Salt Mouth Reagent Bottles, glass stoppered.
- 4 Beaker Glasses, nested.
- 12 Test Tubes, assorted sizes.
- 1 Test Tube Rack.
- 1 Test Tube Holder.
- 1 Test Tube Brush.
- 1 Urinometer with glass, in case.
- 1 30 Minim Graduated Pipette.
- 1 Glass Spirit Lamp.
- 1 Porcelain Evaporating Dish.
- 6 Small Glass Evaporating Dishes.
- 2 Glass Funnels.
- 1 Glass Stirring Rod.
- 2 Wire Holders for Funnels, etc.
- 1 Pack White Filter Paper, 100 sheets.
- 1 Screw Capped Vial, containing Litmus Paper, neutral.
- 1 Pair Pincers for holding Litmus Paper.
- 1 Sheet Gummed Labels.

Complete **25.00**

Vapor Density Apparatus

7340. **VAPOR DENSITY APPARATUS—Dumas;** complete as illustrated without thermometers or bulb **20.00**

7342. **Glass Bulbs**—for above ..... **.30**

7344. **VAPOR DENSITY APPARATUS—Harrington,** very compact, and convenient to handle **3.40**

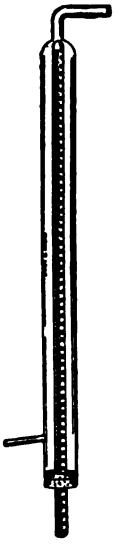
7346. **VAPOR DENSITY APPARATUS—Hoffmann,** with jacket and 6 small glass stoppered bottles. For cut, see next page **7.00**

7348. **Graduated Tube**—for above **3.00**

7350. **Glass Jacket**—for above **2.00**

7352. **Small glass stoppered bottles**—for above ..... each **.40**

7354. **VAPOR DENSITY APPARATUS—Lunge,** complete glass parts as illustrated. For cut, see next page **18.00**



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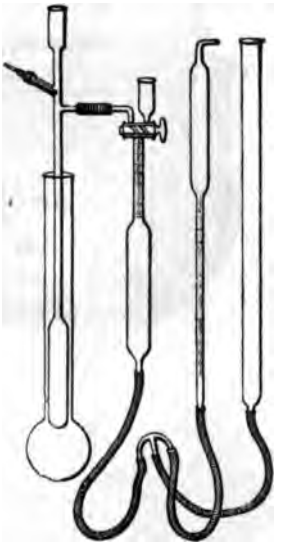

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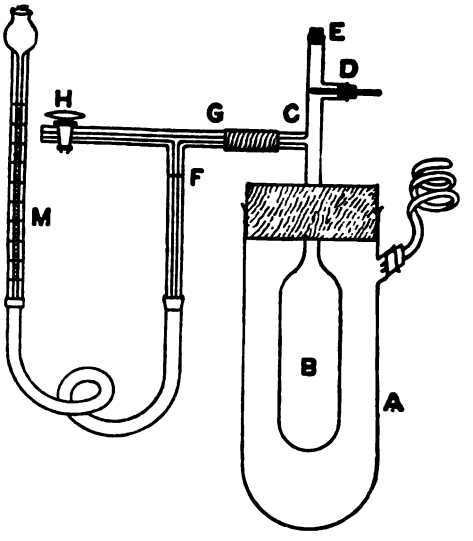
7356



7363

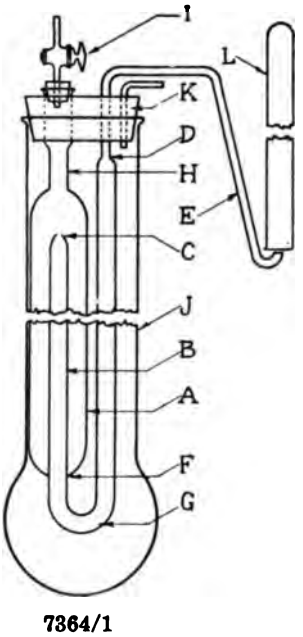
7356. **VAPOR DENSITY APPARATUS—Victor Meyer,** complete **3.00**

7358. **Inner tube**—for above **1.40**

7360. **Glass Jacket**—for above **1.60**

7362. **Small glass stoppered vials**—for above .....**each** **.40**

7363. **VAPOR DENSITY APPARATUS—Victor Meyer, as modified by Lumsden,** see Findlay's Physical Chemistry, Fig. 13. The vaporization tube "B" is here much shorter. It is fitted into the wide boiling tube "A" which carries a spiral glass condenser on the upper right side. With the Victor Meyer apparatus the pressure is maintained constant and the increase in volume is noted. With this apparatus the volume is kept constant and the increase in pressure is noted **8.00**



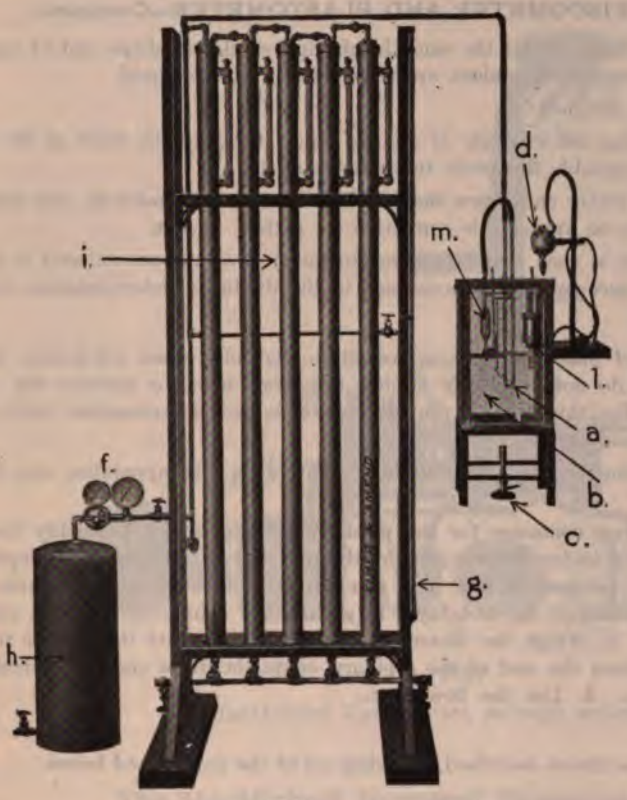
7364/1

7364/1. **VAPOR DENSITY APPARATUS—Victor Meyer, as improved by Dr. Harry B. Weiser** of Rice Institute, see Journal of Physical Chemistry, Vol. 20, No. 6, p. 552, June, 1916. More compact than the original form **8.75**

a. **Inner tube**—of No. 7364/1 ..... **4.25**

b. **Outer tube** **3.00**

c. **Stopcock** **1.65**



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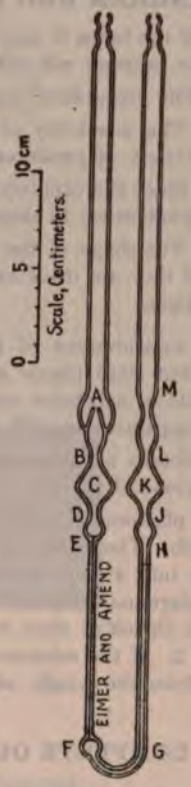


7365a

The Bingham and Green Variable Pressure Viscometer and Plastometer

For many purposes a higher degree of precision is required than is obtained with any of the viscosimeters in general use at present (for which see Oil Testing Apparatus). There is also now a clear understanding of the nature of plastic flow and with it a demand for a precise method of measurement. Both of these demands are met by the variable pressure method as here worked out.

The Viscometer consists of a calibrated glass tube (see illustration 7365a). See also treatise by Bingham, published by the McGraw-Hill Book Co.; bulletins 278 and 298, U. S. Bureau of Standards; Proc. Amer. Soc. Testing Materials, Vols. 18 and 19 (1918 and 1919); Jour. of Amer. Chem. Soc., Vol. 38, p. 40, 1916.

Advantages of the Viscometer

1. Complete temperature control.

2. The pressure may be varied at will so that the kinetic energy correction may be made as small as desired even for very fluid substances. With very viscous liquids, on the other hand, the time of flow may be reduced to a reasonable value by merely increasing the pressure.

3. The apparatus is ready for a duplicate determination in the opposite direction as soon as the first determination is completed, hence there is a large saving of time.

4. The volume of flow is small, being less than 10 cc.

5. The liquid in the instrument is not exposed to dust or other contamination, and in addition evaporation is prevented.

6. The instrument, when mounted on its frame, may be easily cleaned out by means of the ordinary cleaning and drying fluids, such as chromic acid mixture, water, alcohol, and ether.

7. The capillary being long and the velocity of flow low, the viscosity formula applies exactly, so that the results obtained are not only reproducible but they are expressed in absolute units.

(Continued on next page)

THE BINGHAM AND GREEN VISCOMETER AND PLASTOMETER—Continued.

8. If the bulbs C and K in the figure are at the same height and similar in shape and of equal capacity, the pressure will not be appreciably dependent upon the density of the liquid.

9. The "constants" are readily obtained.

10. The possibility of determining the viscosity of a given liquid, for example, water at 20 degrees C., at a variety of pressures gives a valuable flexibility to the apparatus.

11. Since the capillary opens at either end into a mass of liquid under all conditions, and the apparatus is symmetrical in shape, there is no appreciable correction for surface tension.

12. The shape of the instrument is such that errors due to faulty drainage are reduced to a minimum, and they are made evident at once by lack of constancy in the duplicate determinations in opposite directions.

The measurement of the flow of plastic substances resembles that of viscous substances in most respects, but since plastic substances do not drain like liquids, it is convenient to measure the volume (or weight) of substance extruded. For this purpose the plastometer is used in connection with the remaining apparatus instead of the viscometer.

For details of operation of plastometer, see direction sheet which goes with apparatus, also the references previously given.

The plastometer consists of a brass container for the plastic substance, which is readily immersed in the bath. The substance is extruded under definite pressure through a glass capillary of appropriate dimensions, into a glass receiver. The volumes of flow in a given time at two or more pressures enable one to determine easily both the friction and the mobility. In getting the volume of extruded substance there is a choice of three methods: 1. Weigh the material extruded and calculate the volume from the density. 2. If the substance drops from the end of the capillary, count the drops and then calculate the volume from the weight of the drop. 3. Use the flowmeter.

7365. **COMPLETE OUTFIT**—as above described, including all of the parts listed below..... **900.00**

Separate Parts

a. **Viscometer**—(maximum fluidity 500 if not otherwise specified) glass part only **17.50**

b. **Water Bath**—copper, with transparent glass sides, capacity 26 liters; with constant water level device, frame for viscometer or plastometer, and flowmeter, six clamps, and connection for water pipe and drain pipe **150.00**

c. **2 Meker Burners**—No. 3 .....each **3.00**

d. **Motor**—with stirrer and speed control rheostat **40.00**

e. **Thermometer**—scale engraved on the stem, reading to 1/10 degree (— 5 degrees to 105 degrees C.) to meet the requirements of the U. S. Bureau of Standards, without certificate **10.00**

f. **Pressure Regulator** **38.50**

g. **Manometer**—with movable mirror and steel tape graduated in millimeters, mounted on board, without mercury **30.00**

h. **Pressure Tank**—with hand pump **38.00**

i. **Reservoir**—for stabilizing pressure **325.00**

k. **2 Three-way Cocks**—glass 2 mm. bore .....each **2.25**

l. **Plastometer**—with four capillary tubes **90.00**

m. **Flowmeter** **20.00**

n. **3 extra Bases**—for holding capillaries .....each **3.75**

o. **6 Capillaries**—Assorted, for plastometer .....each **3.00**

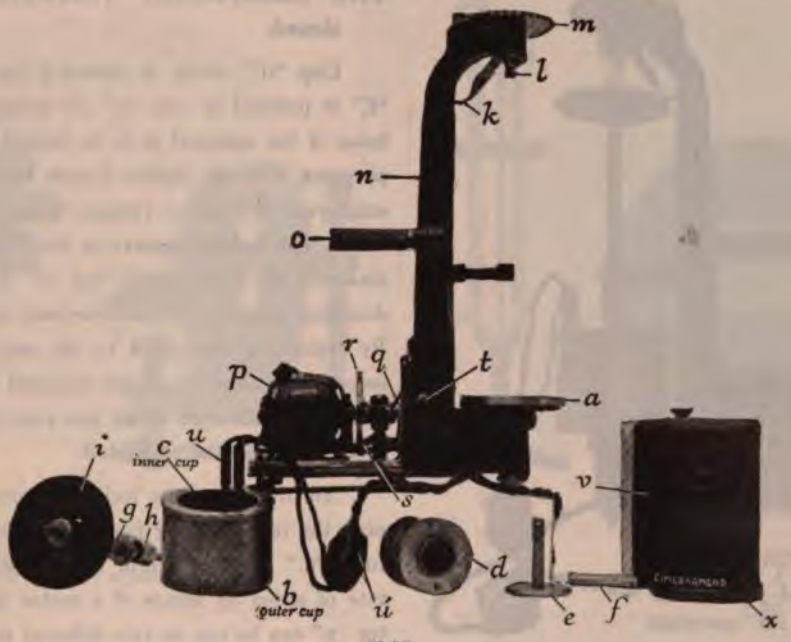
p. **Pycnometer** **4.00**

r. **Sieves**—1 each of 5-inch brass frame, brass gauze 100 and 300 mesh, with one set cover and bottom **15.00**

s. **Comparator**—for reading flowmeter **75.00**

t. **Tank**—and piping for flowmeter **18.00**

u. **Stand**—for comparator **13.50**



7367

MacMichael Viscosimeter, showing separate parts

The MacMichael Improved Viscosimeter, Patented

This instrument is designed for the determination of a wide range of viscosities on the principle of the **Force** required to produce a definite relative movement of the fluid particles in a given time. As originally introduced the range was limited from the viscosities of the light liquids to that of pure glycerine. Many important improvements have been made in the new MacMichael and the instrument, as now supplied, is adapted for the accurate determination not only of the lighter liquids, as formerly, but also of very viscous substances, as, for example, the heaviest and stiffest glues.

Description

A bob, either disc "e" or cylinder "f," is suspended in a cup, "c" or "d," by means of a torsion wire about ten inches long running down through the stem of the spindle "g" and fastened near the bottom. Both bobs are provided with bayonet locking devices so that they may be quickly attached to the spindle. The head of the torsion wire is triangular and is held between two grooved pins "l" attached to a circular revolving head "m." This head is divided into 30 equal sections, and can be set in as many different positions, each section corresponding to 10° on the graduated dial "i." The head is used only when making readings to 1/10 of 1° with the aid of a reflecting mirror cathetometer, a small mirror being attached to the spindle for this purpose. Dial "i," which is divided into 300 equal parts, is secured at the top of the plunger by means of a friction disc, permitting the adjustment of the zero mark to its proper location. A pointer "k" is set by the operator to the zero point on the dial before making the test. The final point of rest of the dial is indicated by the pointer and can be read to ½ subdivision. A dash pot "h" is attached to the spindle to stabilize the motion. The cup "c" is placed in an outer cup "b," which serves as an oil jacket. The oil can be heated by means of an electric heater in the bottom of "b." "C" is provided with an opening for a thermometer and a cover "x" is used to prevent heat radiation.

(Continued on next page)

7367
MacMichael Viscosimeter, ready for operation

THE MacMICHAEL VISCOSIMETER—Continued.

Cup "d," which is intended for use with bob "f," is inserted in cup "c," oil being placed in the latter if the material is to be heated. For ordinary purposes with the lighter liquids bob "e" is usually employed; for more viscous materials bob "f" is used. This bob is concave at the bottom and has a diameter of 1 cm. while cup "d" is 3 cm. inside diameter, giving a clearance around the bob of 1 cm. By regulating the speed to the rate of 1 cm. per second, the force in dynes required to move 1 sq. cm. of the substance under test past another sq. cm., 1 cm. apart, can be computed.

All of the cups are locked by means of slots and pins, the oil cup being fastened to the rotating platform "a." This platform is revolved at a uniform rate of speed by means of a motor drive. The motor "p" can be run at two different speeds by means of gearing "q." It is equipped with a governor "r" so that any speed from about 6 to 120 R.P.M. can be obtained. Motor and governor are enclosed in dust proof case "v." The base and the upright "n" are strongly constructed and leveling screws are provided to secure an accurate vertical position. A handle "o" is attached to the upright so that the instrument can be readily carried. The ordinary lighting circuit can be used for operation and heating. Switch "t" is for starting the motor. The plugs "u," attached to leads, are used for connecting the current with the oil cup. The leads are provided with a switch "ú," which should be "off" when attaching the plugs to pins on cup "b," to avoid arcing.

7367. **COMPLETE INSTRUMENT**—as above described, without wires **210.00**

Separate Parts

b.	**Outer Oil Cup**—complete with heater.	**prices on application**
c.	**Large Inner Cup.**	
d.	**Small Inner Cup.**	
e.	**Disc Bob.**	
f.	**Cylindrical Bob.**	
g.	**Spindle**—with dash pot "h," but without dial "i."	
gg.	**Chuck**—for holding wires.	
i.	**Dial**—only.	
v.	**Cover**—only, for cups.	
w.	**Wires** *—per set.	

* Please specify for what materials or approximate viscosities wires are desired.

Advise current when ordering.

For further details, write for Bulletin 280.

7368

7368/1

7372

7376

7368. **VISE—Hand,** polished jaws.

Width of jaws apart, inches	4	6
Each	**2.00**	**3.00**

7368/1. **VISE—With anvil,** steel faced.

Weight, lbs.	3	6
Each	**2.50**	**5.00**

7370. **VOLTAMETER—Levison,** to measure the strength of electric currents **17.00**

7372. **Ditto**—with support **20.00**

For other Voltameters, see Lecture Apparatus.

7374. **VOLTMETER—Pocket, portable, "H. D. Type,"** compact and light. Mechanism is of the permanent magnet, moving coil type, thus insuring uniform scale divisions and dead beat indications. Moving coil is light and very rigid. Jewels are carefully selected Ceylon sapphires. Dial pure white bristol board. Brass case size 4" x 5" x 2".

For direct current.

Range, volts	3	15	75	150	300
Divisions	1/20	1/5	1	2/1	5/1
Each	**18.00**	**18.00**	**18.00**	**18.00**	**21.60**

7374/1. **Ditto—A. C.**

Range, volts	30	50	80	150	300
Divisions	1/2	1	2/1	2/1	5/1
Each	**18.00**	**18.00**	**18.00**	**18.00**	**21.60**

7376. **VOLTMETER—"Imperial" Type, for direct current,** suitable for general laboratory purposes. Accurate, hand calibrated, best quality jewel and pivot bearings. Brass case furnished in baked enamel. Diameter 4 inches.

Range, volts	10	15	30	50	130
Divisions	1/5	1/4	1/2	1	2/1
Each	**11.90**	**12.20**	**12.20**	**13.00**	**14.40**

7378. **VOLTMETER—"Portable Standard" Type,** of the best make and highest accuracy. A hardwood carrying case is supplied with each instrument; **for direct current.** For cut, see next page.

Range, volts	15	150	300
Divisions	1/10	1	2/1
Each	**68.40**	**72.00**	**79.20**

7378

7398

7387

7378/1. **VOLTMETER**—same type as No. 7378, but **for alternating current.**

Range, volts	30	75	150	300
Divisions	1/5	1/2	1	2/1
Each	**68.40**	**68.40**	**72.00**	**79.20**

7380. **MILLIVOLTMETER**—same type as above, but **for direct current.**

Range, millivolts	75	150	1500
Divisions, m. v.	1/2	1/1	10/1
Each	**64.80**	**64.80**	**64.80**

WASH BOTTLES—See **Bottles,** pages 100–101.

7382. **WATCH GLASSES**—Well annealed, with ground edges.

Diameter, inches	1	1½	2	2¼	2½	2¾	3
Dozen	**.70**	**.75**	**.90**	**1.00**	**1.05**	**1.15**	**1.20**
Gross	**7.25**	**7.50**	**9.00**	**10.00**	**10.50**	**11.50**	**12.00**
Diameter, inches	3¼	3½	3¾	4	4¼	4½	5
Dozen	**1.30**	**1.35**	**1.60**	**1.65**	**1.75**	**1.80**	**1.90**
Gross	**13.00**	**13.50**	**16.00**	**16.50**	**17.50**	**18.00**	**19.00**
Diameter, inches	5½	6	6½	7	8	9	10
Dozen	**2.20**	**2.50**	**2.90**	**3.50**	**4.20**	**5.20**	**6.50**
Gross	**22.00**	**25.00**	**29.00**	**35.00**	**42.00**	**52.00**	**65.00**

7386. **WATCH GLASSES—Counterpoised, in pairs;** accurately adjusted for analytical balance; diameter 2½ or 3 inches ..... **per pair** **1.35**

7387. **WATCH GLASSES—Syracuse,** solid glass, latest improved form, bevelled plain; can be conveniently nested as shown in illustration. Outside diameter 65 mm., inside diameter 50 mm., depth 10 mm. ..... **dozen** **.90**

7387/1. **WATCH GLASSES—Syracuse,** with ground bevelled surface for writing on ..... **dozen** **1.15**

WATCH GLASS CLIP—Brass, nickel plated, see No. 2091.

7390. **WATCH GLASS CLIP—No. 2091,** with set of 2 watch glasses ground tight.

Diameter of glasses, inches	2	2½
Set	**.80**	**.90**

WATCH GLASS CLIP—Bunsen, of brass, see No. 2091/1.

7394. **WATCH GLASS CLIP—No. 2091/1,** with set of 2 watch glasses, ground tight.

Diameter of glasses, inches	2	2½
Set	**1.00**	**1.10**

7396. **WATCH SPRINGS**—For burning in oxygen ..... **per dozen** **.30**

WATER—Special Apparatus for the Microscopical Examination of Water, as described in "The Microscopy of Water," by Geo. C. Whipple.

7398. **Sedgewick-Rafter Funnel**—graduated; with attachment and rubber stopper **3.25**

7400. **Ditto**—not graduated **1.75**

(Continued on next page)

WATER TESTING APPARATUS—Continued.

7402. **Berkshire Sand** ..... per pound .15

7404. **Bolting Cloth Discs** ..... per dozen .15

7406. **Support—for funnel** 1.30

7408. **Counting Cell** 5.25

7410. **Cover Slip** ..... .10

7412. **Eyepiece Micrometer** 6.25

7414. **Pipettes—1 cc. and 5 cc.** ..... per set .40

7416. **Graduated Flask—25 cc.** ..... .60

WATER BATHS—see Baths.

WATER BOTTLES—see page 100.

WATER DECOMPOSITION APPARATUS—see Lecture Apparatus.

WATER FILTERS—see Filters.

WATER HEATERS—see Heaters.

WATER STILLS—see Distilling Apparatus.

7417

7417/1

7417. **WAX—Melting Point Tester.** Thoroughly reliable, easy to operate and well constructed. Only 3 parts. Complete with thermometer 16.00

7417/1. **WAX—Melting Point Tester, Saybolt improved** Represents the maximum in simplicity, efficiency, and durability. Four samples may be tested at the same time. Complete with 4 thermometers 55.00

7422. **WIRE—Aluminum.**

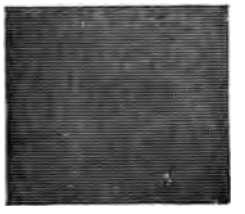
B. & S. gauge No.	12	14	16	18	20	22	26
Per ounce	.15	.15	.16	.17	.18	.25	.55
Per pound	1.50	1.50	1.60	1.65	1.80	2.50	5.50

7424. **WIRE—Brass.**

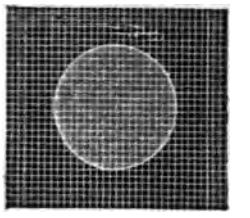
B. & S. gauge No.	16	18	20	22	24	26	28	30
Per ¼ pound	.45	.45	.45	.45	.50	.60	.85	1.00
Per pound	1.50	1.50	1.50	1.50	1.60	2.20	2.90	3.60

7426. **WIRE—Copper, bare.**

B. & S. gauge No.	14	16	18	20	22	24	27	30
Per ¼ pound	.40	.40	.40	.40	.40	.45	.65	.95
Per pound	1.30	1.30	1.30	1.30	1.30	1.50	2.20	3.45



7450–52



7456

7428. **WIRE—Copper,** single cotton coated.

B. & S. gauge, No..	12	14	16	18	20	22	24	27	30
Per ¼ pound.....	.50	.50	.50	.50	.50	.50	.60	.90	1.35
Per pound	1.60	1.60	1.60	1.60	1.60	1.60	2.00	3.00	4.60

7436. **WIRE—Nickel,** pure.

B. & S. gauge, No.....	12	14	16	18	20	22	25	30
Per ounce	.25	.25	.25	.25	.28	.30	.30	.35
Per pound	2.50	2.50	2.50	2.50	2.75	3.00	3.00	3.50

7437. **WIRE—Nickel silver.**

B. & S. gauge, No.....	16	18	20	22	24	26	28	30
Per ¼ pound	.70	.70	.70	.85	.90	.90	1.00	1.20
Per 1 pound	2.20	2.20	2.20	2.80	3.00	3.00	3.50	4.25

7438. **WIRE—Iron, C. P.,** containing 99.95% Fe.....per ounce .20
per ¼ pound .40
per pound 1.25

WIRE—Platinum, see **Platinum Ware.**

WIRE GAUGES—see **Measures.**

7442. **WIRE GAUZE—Brass.**

Mesh	10	20	30	40	60	80	100
Square foot	.90	.90	.90	.90	1.20	1.50	2.10

7444. **WIRE GAUZE—Copper,** for combustions, etc.

Mesh	10	20	30	40	60	80	100
Square foot	.90	.90	.90	.90	1.20	2.00	2.20

7446. **WIRE GAUZE—Iron,** for sieves, tripod tops, etc.

Mesh	6	10	14	16	20	40	60	80
Square foot	.35	.35	.40	.40	.40	1.00	2.25	2.50

WIRE GAUZE—Platinum, see No. 5378.

7448. **WIRE GAUZE—Squares, Brass,** thickness and mesh of wire most desirable for use on tripods, etc.

Size, inches	4x4	5x5	6x6	8x8
Each	.14	.25	.30	.60
Per dozen	1.40	2.50	3.00	6.00

7450. **WIRE GAUZE—Squares, iron.**

Size, inches	4x4	5x5	6x6	8x8
Each	.05	.08	.11	.22
Per dozen	.50	.80	1.10	2.20

7452. **WIRE GAUZE—Squares, Nichrome.** On account of the high heat-resisting quality of this alloy, the squares will last much longer than those of iron.

Size, inches	4x4	5x5	6x6
Each	.45	.65	.95

Fused Silica Plates—(used as a substitute for wire gauze), see **Plates.**

7456. **WIRE GAUZE—Squares,** tinned wire; with flat asbestos centre.

Size, inches	4x4	5x5	6x6
Each	.15	.16	.18
Per dozen	1.60	1.80	2.00

ADDITIONAL CATALOGS AND BULLETINS

BACTERIOLOGICAL CATALOG. **Section I.** Microscopes, Microtomes, Blood and Bacteria Counting, Dissecting Apparatus, etc.

Section II. Incubators, Sterilizers, Centrifuges, Water Stills, etc.

CHEMICAL CATALOG, Comprising Chemicals, Reagents, Drugs, Stains, etc.

BULLETINS

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200. Fuel Testing Apparatus
201. Pyrex Glass Ware
203. Whatman Filter Paper
206. Kimley Electro Analysis Apparatus
209. Outfits for Testing Milk and Water
213. Shield Autoclaves
215. Cenco-Nelson Vacuum Pump
216. Cenco-Nelson Rotary Blower
230. Juerst Ebulliometer
250. Foster Gluten Tester
252. E. & A. Filter Paper
255. Water Distilling Apparatus
256. Young's Gravitometers
258. Wysor Polishing and Grinding Machines
267. Multiple Replaceable Unit Electric Furnaces
268. Hortvet Cryoscope
269. American Rotary Vacuum Pumps
270. E. & A. Universal Carboy Inclinator
271. Earp Thomas Culture Flasks
273. Gramercy Armored Stopper
275. Pickel Extraction Apparatus
277. Bingham & Green Viscometer and Plastometer
278. Hortvet Butter Test Bottle
279. Fleming Mercury Seal Absorption Bulbs
280. MacMichael Viscosimeter

Apparatus for Testing Asphalt and Fuel Oils
Bailey Burettes
" Extraction Apparatus
" Pipettes
Banks H_2S Generator
B. & L. Metallographic Equipment
Braun Crushers, Furnaces, and Pulverizers
Burrell Gas Masks
Chainomatic Specific Gravity Balances
Coors Porcelain Ware
Daniels Adiabatic Calorimeter Jacket
Detroit Gasoline Gas Apparatus
Distilling Apparatus
Dulin Rotarex
E. & A. Universal Hydrometers
" " " " Motors
Electric Furnaces, Replaceable Unit, Hevi-Duty
Electric Furnaces, Platinum Wound
Electric Hot Plates, Replaceable Unit
Emerson Conditioning Ovens
Fleming Combustion Apparatus
Freas Conditioning Ovens
" Conductivity Apparatus
" Incubators and Sterilizers
" Ovens and Tube Furnaces
" Vacuum Ovens
" Water Baths and Thermostats
Gas Calorimetry
Gramercy Reagent Bottles
" Stirrers
Kraus Vacuum Pumps
Lind Electroscopes
Mackenzie Polygraph
Munn H_2S Generator
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